VALUATION OF CONVERTIBLE PREFERRED SHARES WITH FOCUS ON KOREAN MARKET

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ABSTRACT

This thesis attempts to identify fundamental factors determining valuation of convertible preferred shares. After clearly identifying characteristics of the preferred shares, we reviewed the literature and found that there are three fundamental factors for the valuation of convertible preferred shares; dividend guarantee, voting rights and convertibility. To test the three fundamental factors, we developed six hypotheses focusing on dividends, block holding shares, time to conversion, leverage, market yield spread and market returns. To estimate the value of the preferred shares, we structured two ordinary least squares (OLS) models setting dependent variables as preferred share premium (Model 1: PS premium) and quarterly dividend yield of preferred shares (Model 2: QDYP), respectively. Based on F-stat and adjusted R-squared, Model 1 best explains the variations of the preferred share premium and fits well to the data sets.

This thesis found that there are significant values for convertibility and voting rights and these values are discounted by time and getting more valuable as approaching their conversion dates. Regarding the time value of convertibility and voting rights, we have found there are interesting arbitrage trade opportunities between the common shares and the preferred shares. We also concluded that there are significant values for cumulative dividends. By comparing values among common shares, convertible preferred shares and non-convertible preferred shares, we calculated that values of voting rights and dividend cumulativeness are 43% and 39% of common shares, respectively. This thesis provides new evidences for the value of convertibility, the value of voting rights and the dividend guarantee. We believe that these considerable corporate governance related values are largely due to weak legal protection and idiosyncratic corporate governance structure in Korea.

Controlling growth, volatility, liquidity, size, share buyback, rate environment and crises, we get significant regression results suggesting that on average the convertible preferred share premium is positively associated with leverage and time to conversion. Surprisingly, the convertible preferred share premium is negatively associated with the dividend yields. This is probably due to the voting rights recovery upon the dividend omission. For block holding, the bond-like non-convertible preferred shares have shown positive significant relations. This bondness of non-convertible preferred shares are more apparent with significant negative coefficients for the market yield spread and the market return. Additionally, we also documented a liquidity premium for the valuation of preferred shares. We think exemption of capital gains tax in Korea makes easiness to sell very valuable.

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CHAPTER I. INTRODUCTION

Preferred shares received little attention from academia despite their repetitive issuance booms in the past and resilient demand in the current low interest rate environment. Recent issuance booms were the 2008 TARP (Troubled Asset Relief Program) capital injection into troubled financial institutions and General Motors Company's $4.35bn convertible preferred shares issuance in 2010 (Kallberg et al., 2013). In late 2016, the Canadian preferred market saw signs of recovery. In September 2016, Toronto-Dominion Bank issued C$1bn of preferred shares which was the largest Canadian preferred share issuance (Kwon, 2016). It is worth to note that before 1986 Canada[1] funded more than 25% of gross new investments with preferred shares (Fatemi et al., 2002).

If one expands the scope beyond North America, preferred shares are more central to market dynamics. For example, one of Asia's largest tech companies, Samsung Electronics, has a large and liquid preferred share (KO:SEP) with C$42[2] billion market capitalization, which is 11% of its common share's market capitalization. In January 2018, Korea's leading broker Mirae Asset Daewoo decided to issue C$0.8 billion (21% of common shares outstanding) of new non-convertible preferred shares. In Sweden, more than 55% of public equity issuers have dual-share structure of the preferred shares (Bjuggren et al., 2007). Convertible preferred shares have been significant funding sources in Australian market in 1990s (Davis, 1996). Given their low correlation to common shares and bonds and attractive dividend yield, preferred shares are gaining market popularity in the current globally low interest rate environment (Brzenk and Soe,

[1] Fooladi et al. (1991) argued that with the existence of dividend tax credit Canadian firms finance more heavily with preferred shares than do American firms.
[2] For brevity, we convert Korean won into Canadian dollars using 900 KRW/CAD currency exchange ratio as of March 2018.

2015). Also, their hybrid nature allows intermediate risks and medium returns, which find values in portfolio construction (Bajaj et al., 2002; Davis, 1996).

The limited literature on preferred shares may be due to the long silence in North American markets and lack of theoretical understandings on issuance rationales and valuation models. Despite lack of literature and theoretical discussion of preferred shares, we attempt to contribute to the academia by enhancing our understanding on the valuation of preferred shares. We chose Korean convertible preferred shares as our subject of study given data availability, popularity in Korean market and unique product structures such as convertibility and dividend cumulativeness. Expanding this analysis into other species and other markets may be an interesting research topic but is beyond the scope of this research. To the best of our knowledge, this is the first attempt to examine the valuation of convertible preferred shares in Korea using fundamental factors which not only focus on corporate governance but also dividends and convertibility. So far previous studies have been limited to corporate governance related voting rights without looking at dividend structures and time varying value of convertibility.

This thesis believes there are values for the dividend, corporate governance and convertibility in the valuation of the convertible preferred shares. Using OLS regression, we found unique features of the convertible preferred shares such as dividend guarantees, convertibility and voting rights have significant relations with the convertible preferred share premium. This thesis has a following structure. In Chapter II, we first review the pre-existing literature on the overall preferred shares market in terms of product identity, theoretic factors determining their premiums and issuance rationales. In Chapter III, we then provide theoretical arguments and generate hypotheses to conduct empirical tests on the convertible preferred share premium over the common shares. In Chapter IV, we review our data and models for ordinary

least squares (OLS) regressions and explain our results. In Chapter V, we discuss our OLS results and provide their implications. In Chapter VI, we conduct robustness checks by running separate OLS regressions by grouping the samples based on cumulativeness of their dividends and dividing samples before and after the 2008 Subprime Mortgage Crisis. In Chapter VII, we conclude the thesis with future research suggestions.

Overview of Korean preferred shares

As seen in Table 1.1, there are three types[3] of preferred shares that are actively traded in Korean market. Although we can track the preferred shares back to the late 80s, it was the 1995 Commercial Code Amendment, which allowed the current settings of the three types of preferred shares. The 1995 Amendment of Commercial Code divides preferred shares in old and new preferred shares. First type is old preferred shares which are non-convertible with dividend yield of 1% more[4] than common share. Second type is new non-convertible preferred shares with minimum dividend yield guaranteed. Third type is new convertible preferred shares which have convertibility with a typical time to conversion of 10 years. Before moving into literature review, it would be helpful for us to explain the three types of preferred shares with representative examples. Based on public disclosures and articles of incorporation of the sample firms, we have selected representative preferred shares of each type and summarized major characteristics of Korean preferred shares as below.

[3] There is the fourth type of the preferred shares, the redeemable convertible preferred share. Given its limited sample size, we do not include it into our sample. We have found that JW Pharmaceutical 4, 5 and 6 redeemable convertible preferred shares are currently trading in the Korean market.

[4] The old preferred shares in Korea are similar to savings shares in Italy, which has following features; 1) a minimum dividend, equal to 5 percent of the par value, and 2) being entitled to receive common share dividend plus 2 percent of the par value (Zingales, 1994).

Table 1.1 Three types of the preferred shares in Korea

Types	Representative	Market cap.	Dividend	Cumulative	Conversion
Old non-convertible preferred share	Samsung Electronics Preferred	C$42bn	Maximum [+9% of Face Value, Common Share Dividend per Share + 1% of Face Value of Common share]	No	No
New non-convertible preferred share	Hyundai Motor Preferred 2	C$4bn	Maximum [+2% of Face Value, Common Share Dividend per Share]	No	No
New convertible preferred share	Daesang Preferred Shares 3	N/A	Maximum [+3% of Face Value, Common Share Dividend per Share]	Yes	Yes

First, due to long issuance history and perpetuity, the old preferred share is the largest group among the three species of preferred shares. Samsung Electronics Preferred Share (KO:SEP) was issued in 1989 and is a representative example of the old non-convertible preferred shares with C$42 billion market capitalization. It is non-cumulative and non-voting without a conversion option. Dividends are declared while meeting the following three conditions; 1) minimum 9% of face value should be paid as dividend, 2) 1% of face value higher dividend should be paid than the common shares, and 3) when the dividend ratio of the common shares exceeds that of the preferred shares, the additional dividend on preferred shares should be declared in the amount equivalent to the exceeding ratio. The following is an equation that explains the dividends of Samsung Electronics Preferred Share:

Equation 1.1

Dividend_{old} = Maximum [+9% of Face Value, CS dividend yield + 1%, CS DPS]

When dividends are not paid to preferred shareholders, voting rights of the preferred shares are recovered until new dividends are declared. In the case of rights issue, bonus issue or stock dividend, the holders of common shares will be entitled to common shares, and the holders of preferred shares will be entitled to preferred shares, in proportion to their respective shareholdings.

Second, after the 1995 Amendment of Commercial Code, the regulation allowed more discretion in setting dividend structures of preferred shares and thus created the second species of new non-convertible preferred share. Hyundai Motor Preferred Share 2 (KO:HDR) is the most liquid example of the new non-convertible preferred shares with C$4 billion market capitalization. Hyundai Motor Preferred Share 2 is non-cumulative and non-voting. It has the two following conditions for dividends; 1) minimum 2% of face value should be paid as dividend, 2) the additional dividend on preferred shares shall be declared by participating in distribution of dividend at the same ratio of dividend on common shares, at the time of distribution of dividend on common shares. The following is an equation that explains the dividends of Hyundai Motor Preferred Share 2:

Equation 1.2

$\text{Dividend}_{\text{new non-conv}}$ = Maximum [+2% of Face Value, CS DPS]

When dividends are not paid, voting rights of the preferred shares are recovered until new dividends are declared.

Lastly, the 1995 Amendment of Commercial Code introduced the third type of preferred shares, the new convertible preferred share. Typical new convertible preferred shares are converted to common shares with 1:1 conversion ratio and 10 years of time to conversion[5]. Daesang Preferred Shares 3 (50477J) is a representative example of the new convertible preferred shares. It was issued in 2007 and converted to common shares in April 2017 with 10 years of time to conversion. Based on its public filings, we found that it has following features. Minimum 3% of face value should be paid as dividend. When the dividend yield of the common

[5] Other than 10 years of time to conversion, we have convertible preferred shares with time to conversion of 1.5 years, 2.5 years, 3 years, 4 years and 5 years. Yet, 10 years of time to conversion composes of 44% of our convertible preferred shares samples.

shares exceeds that of the preferred shares, the additional dividend on preferred shares should be declared in the amount equivalent to the exceeding ratio. The following is an equation that explains the dividends of Daesang Preferred Share 3:

Equation 1.3

$\text{Dividend}_{\text{new conv}}$ = Maximum [+3% of Face Value, CS DPS]

After 10 years from issuance, the preferred shares are converted into common shares with 1:1 conversion ratio. If there are periods of not paying dividends, the conversion is delayed until the dividends in arrears are paid. When dividends are not paid, voting rights of the preferred shares are recovered until new dividends are declared at the board of directors meeting. Dividends of Daesang Preferred Shares 3 are cumulative. It is worth to note that in our data sample, convertible preferred shares show a higher portion (44%) of cumulative dividends than the overall sample (16%).

When dividends are cumulative, investors are assured in their cash inflows. This yield guarantee feature is expected to lead into the higher values of the cumulative preferred shares than the non-cumulative preferred shares. Also, we expect there are values for the convertibility as the conversion will provide voting rights and better market liquidity. Based on this, the new convertible preferred share, Daesang Preferred Shares 3 should be valued the highest among the three types of the preferred shares. In data section, we will examine this valuation question estimating the convertible preferred share premiums compared to the common shares in large enough panel data.

In Table 1.2, we have illustrated product characteristics of Daesang's common shares and three preferred shares. Dividends have been paid in line with corresponding dividend formula. Dividend formula's benchmark is face value rather than market yield. While Daesang Preferred

Share 1 is non-convertible and non-cumulative, both Daesang Preferred Share 2 and 3 are convertible with 10 years of time to conversion and cumulative. Daesang Preferred Share 2 and 3 have paid cumulative dividends when they resumed dividend payment in 2010 after missing two years of dividends during the 2008 Subprime Mortgage Crisis.

Table 1.2 Illustration of representative preferred shares - Daesang case

Table 1.2 presents dividend history of a major Korean food manufacturing firm Daesang. Daesang has one old non-convertible preferred shares and two new convertible preferred shares. Table 1.2 has following information on Daesang's common share and its three preferred shares; face value (FV), dividend payout ratio (payout), dividend cumulativeness (cumulative), issuance date (issued), conversion date (converted), original time to conversion (time to conversion), dividend per share (DPS) and convertible preferred share premium (Premium PS 3).

Daesang case (Korean won for per share items)

			Common share	Preferred Share 1	Preferred Share 2	Preferred Share 3
Formula				Max [CS DPS + 1%]	Max [+3% of FV, CS DPS]	Max [+3% of FV, CS DPS]
Type			Common share	Old Non-convertible	New Convertible	New Convertible
Cumulative			NO	NO	YES	YES
Issued			1970	1990	4/12/1999	4/27/2007
Converted			NA	NA	4/14/2011	4/17/2017
Time to Conversion			Perpetuity	Perpetuity	10 year	10 year
DPS	**FV**	**Payout**	**DPS-CS**	**DPS-PS1**	**DPS-PS2**	**DPS-PS3**
DPS (99)	500	7.34%	50	55	55	NA
DPS (00)	500	39.77%	35	40	35	NA
DPS (01)	1,000	-8.00%	30	40	30	NA
DPS (02)	1,000	0.00%	0	0	0	NA
DPS (03)	1,000	19.12%	100	110	100	NA
DPS (04)	1,000	30.49%	100	110	100	NA
DPS (05)	1,000	0.00%	0	0	0	NA
DPS (06)	1,000	0.00%	0	0	0	NA
DPS (07)	1,000	35.59%	100	110	160	100
DPS (08)	1,000	0.00%	0	0	0	0
DPS (09)	1,000	0.00%	0	0	0	0
DPS (10)	1,000	20.24%	150	160	210	210
DPS (11)	1,000	6.53%	100	110	NA	100
DPS (12)	1,000	7.35%	150	160	NA	150
DPS (13)	1,000	6.00%	150	160	NA	150
DPS (14)	1,000	11.65%	300	310	NA	310
DPS (15)	1,000	24.72%	400	410	NA	400
DPS (16)	1,000	22.30%	400	410	NA	400

Dividend yield (market)

Year	Premium PS 3	Common share	Preferred Share 1	Preferred Share 2	Preferred Share 3
1999	NA	0.32%	0.45%	NA	NA
2000	NA	0.57%	1.02%	0.70%	NA
2001	NA	0.79%	1.32%	1.01%	NA
2002	NA	0.00%	0.00%	0.00%	NA
2003	NA	2.08%	4.56%	3.34%	NA
2004	NA	2.00%	4.21%	2.74%	NA
2005	NA	0.00%	0.00%	0.00%	NA
2006	NA	0.00%	0.00%	0.00%	NA
2007	NA	0.84%	2.24%	1.55%	NA
2008	-16.78%	0.00%	0.00%	0.00%	0.00%
2009	-22.81%	0.00%	0.00%	0.00%	0.00%
2010	-27.20%	1.86%	5.07%	2.80%	3.57%
2011	-22.62%	0.91%	2.93%	NA	1.18%
2012	-25.52%	0.80%	3.61%	NA	1.07%
2013	-21.52%	0.44%	1.88%	NA	0.56%
2014	-12.41%	0.69%	1.77%	NA	0.82%
2015	-6.50%	1.10%	2.60%	NA	1.18%
2016	-1.70%	1.33%	2.93%	NA	1.36%

In addition to the cumulativeness, it is worth to note that the conversion of Daesang Preferred Share 2 has been delayed for 2 years, where the conversion date has moved from the original year 2009 to a later year of 2011. This is due to the 2008 and 2009 dividend misses in the middle of the 2008 Subprime Mortgage Crisis. This "conversion delay ption" is valuable to the issuers but negative to convertible preferred shareholders. This is obvious when we see the convertible preferred share premium drops to -27% to a lowest level in 2010 when the issuers missed two consecutive dividends and delayed the conversion for two years.

In Chart 1.1, we have drawn share prices of Daesang Preferred Share 3 along with Daesang common share for 3 years of time window. In the thin broken line, we have also calculated the convertible preferred share premium over the common share. With the thick broken line, we plotted Daesang Preferred Share 3. In the continuous line, we plotted Daesang common share. With three circles, we indicated three ex-dividend dates for 2015, 2016 and 2017.

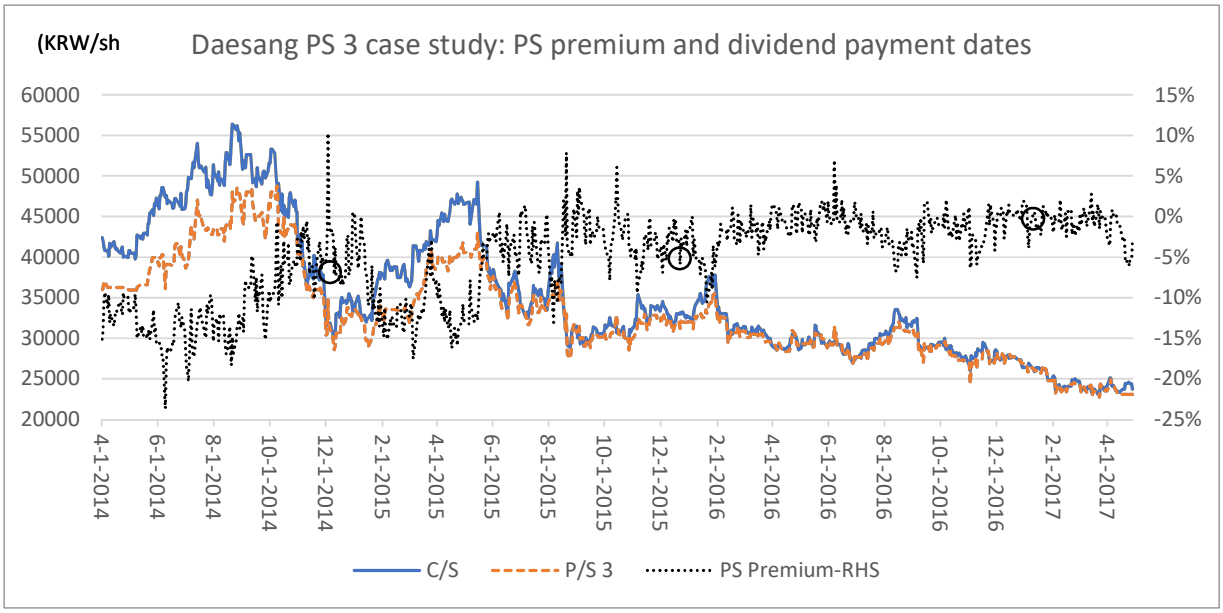

Chart 1.1 Daesang Preferred share 3 case study: Premium and Ex-dividend dates

Chart 1.1 presents 3 years of time series data of the convertible preferred share premium of a major Korean food manufacturing company Daesang. Along with the time series data, we highlighted ex-dividend dates for the last three years until Daesang Preferred Share 3's conversion in April 2017. We plotted three price information; Daesang

common share price (C/S), Daesang Preferred Share 3 price (P/S 3) and Daesang Preferred Share 3's premium over the common share (PS Premium-RHS). Prices are in Korean won per share, while the convertible preferred share premium is in percentage.

There are two interesting patterns to highlight. First, the convertible preferred share premium gets higher as the ex-dividend dates approach, and then it moves back into deeper discount after the ex-dividend dates. This implies that there may be arbitrage trade opportunities between the convertible preferred share and the common share. In other words, some investors of Daesang may buy into Daesang Preferred Share 3 as they approach the ex-dividend dates, and then they switch to the common shares after ex-dividend dates. Theoretically, this could create a profitable and visible long-short strategy between Daesang common shares (long) and Daesang Preferred Share 3 (short).

Second, the convertible preferred shares premium approaches zero as the time to conversion diminishes. Despite a few spikes, the convertible preferred share premium remains around the zero levels from early 2016 to its conversion in April 2017. Moreover, the arbitrage opportunities between Daesang Preferred Share 3 and its common share seem to be less likely during this period. In our understanding, this means that the value discounts regarding the conversion and the voting rights are narrowing as there are less time left before conversion. These observations suggest a long-short strategy between the common share and the convertible preferred shares can be profitable particularly if it is initiated early after the issuance of the convertible preferred shares and closed when conversion is approximately one and half years away.

Given the observations from Chart 1.1, it is compelling to examine whether these observations are consistent across other cases. For this purpose, we picked Hyundai Steel as another case. This is a manufacturing cyclical company, Hyundai Steel's convertible preferred

shares were converted in March 2010 shortly after the 2008 Subprime Mortgage Crisis which caused both the common share and the convertible preferred share prices to trend upwards as the conversion date approached. As seen in Chart 1.2, the observations made from Chart 1.1 can be repeated in the case of Hyundai Steel.

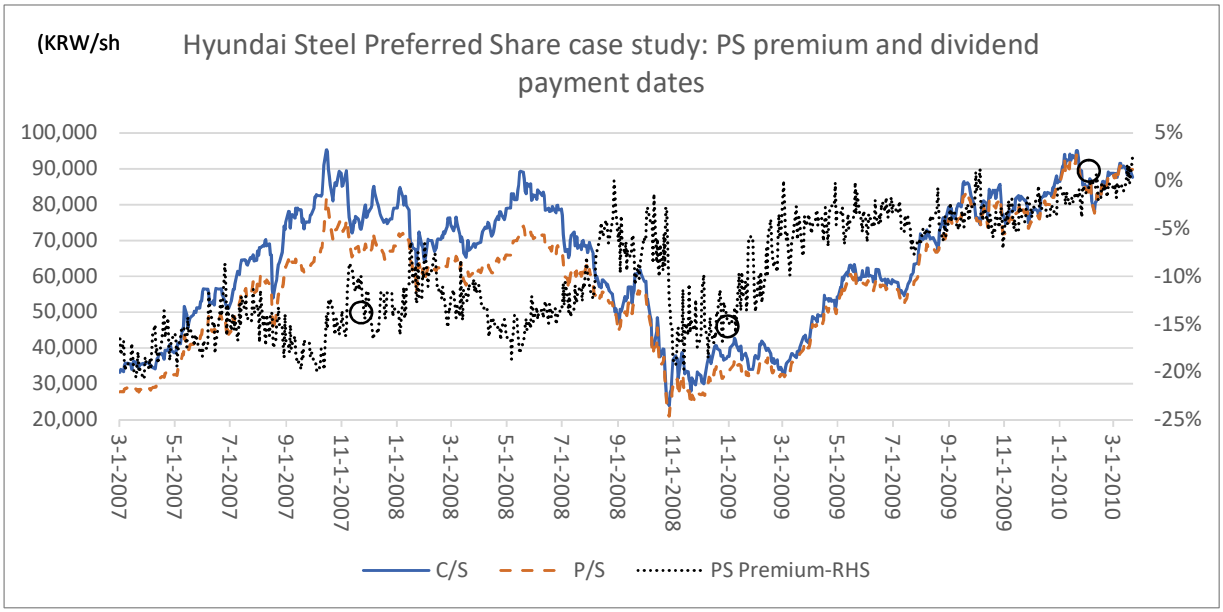

Chart 1.2 Hyundai Steel Preferred Share case study: Premium and Ex-dividend dates

Chart 1.2 presents 3 years of time series data of the convertible preferred share premium of a major cyclical steel maker Hyundai Steel. Along with the time series data, we highlighted ex-dividend dates for the last three years until Hyundai Steel Preferred Share's conversion in March 2010. We plotted three price information; Hyundai Steel common share price (C/S), Hyundai Steel Preferred Share price (P/S) and Hyundai Steel Preferred Share's premium over the common share (PS Premium-RHS). Prices are in Korean won per share, while the convertible preferred share premium is in percentage.

Besides the arbitrage opportunities and the price convergence, we also found another interesting pattern from Chart 1.2. In November 2008 when the 2008 Subprime Mortgage Crisis had the worst impact on the stock market, the Hyundai Steel Preferred Share was traded at the largest discount to Hyundai Steel Common Shares. We propose that this is due to "flight to liquidity" phenomena observed by Amihud (2002). We will attempt to provide theoretical explanation for this phenomenon in the following chapters.

CHAPTER II. LITERATURE REVIEW

Hybrid-nature of preferred shares

Despite the significant market interest, researchers do not have consensus regarding the theoretical foundation and valuation methodology of convertible preferred shares. Modern textbooks do not have an agreed upon view about preferred shares' identity and valuation models (Koller et al., 2005; Kieso et al., 2004; Copeland et al., 2005). In a text book widely read by financial analysts, Koller et al. (2005) highlight preferred shares' dividend perpetuity and suggest "valuing preferred shares as unsecured debt discounting the expected preferred dividends in perpetuity at the cost of unsecured debt." In contrast, researchers emphasizing accounting features consider the preferred shares as equity given the fact that preferred dividends allow dividend arrearage without causing default risks (Kieso et al., 2004; Emanuel, 1983).

The above textbooks focus on one-sided valuation method and emphasize classification of preferred share either into bond or equity. Instead of focusing on the bond-equity dichotomy, we emphasize the hybrid nature of the preferred shares and assume that a single preferred share may be trading like bond or equity depending on fundamental factors. We are also more interested in the valuation of the convertible preferred shares, as measurement of the valuation gap between the common shares and the convertible preferred shares will allow us to better understand the value of theoretic components of preferred shares, which are difficult to observe in a comparison between a perpetual fixed-dividend preferred share and common shares. This research question will be examined by indirect estimation of the convertible preferred share premium over the common shares, because the major differences between the common shares and the convertible preferred shares are dividend guarantees, voting rights and time to conversion.

Remembering the celebrated Miller-Modigliani irrelevance theory, one may wonder about any values in our inquiry into the value of dividend, voting rights and convertibility. Miller and Modigliani (1961) argued, *"[v]alues are determined solely by "real" considerations- in this case the earning power of the firm's assets and its investment policy - and not by how the fruits of the earning power are 'packaged' for distribution."* However, our examination into the previous literature suggests that there are significant valuation discrepancies between seemingly same assets including dual-class shares and common-preferred shares. Empirical studies on dual-class shares and preferred shares suggest that it is not unusual to observe significant valuation gaps between voting and non-voting shares. Zingales (1994) estimates the value of voting shares is more than 80% higher than the value of non-voting shares listed on the Milan Stock Exchange. Fatemi and Krahnen (2000) find that the common share premium over the preferred shares in Germany is more than 40%. Levy (1982) finds that the Israeli market shows more than 100% voting premium for dual-class shares. Empirical study by Nenova (2003) suggests that the voting right premium in Korea is 48% of firm value in the samples including the financial crisis of 1997. We believe there exist values for dividend guarantees, voting rights and convertibility and attempt to test them by indirectly measuring the convertible preferred shares premium over the common shares.

Determinants of the convertible preferred shares premium

We found the discussions of Bildersee (1973), Ingersoll (1977) and Fatemi and Krahen (2000) very useful in understanding the determinants of the common share premium. Each scholar pays attention to stability, convertibility and voting rights, respectively. In his empirical study on performance of preferred shares, Bildersee (1973) suggests low quality preferred shares with high beta behave like equity, while high quality preferred shares with low beta behave like

bond (Bildersee, 1973). Bildersee also sees preferred shares experience less systematic risks than common shares. We find that a major driver for the less systematic risks is the higher dividend yields of the preferred shares on the back of stable cash flow. Some preferred shares also have dividend guarantee features such as dividend cumulativeness. This assures much stable cash flow from preferred shares.

Ingersoll (1977) believes that the convertible preferred shares have call optionality and the conversion price and the firm value should be considered in valuation. Ingersoll suggests that a convertible preferred share may be traded like equity when its firm value is high given higher conversion possibilities. On the other hand, a convertible preferred share with low firm value should be traded like bond. Convertible preferred shares have similarities with European call options[6], which have potential conversion options to common shares with fixed maturities. The convertibility feature is a sweetener to the preferred shares and should have value. Lee and Figlewicz (1999) even call the convertible preferred shares as "delayed equity" or "backdoor equity financing."

However, Mais et al. (1989) suggest that the conversion of convertible preferred shares into common shares reduces firm leverage and signals negatively. Also, conversion of non-voting preferred shares into voting shares leads into the dilution of voting rights, which has adverse equity valuation effect. However, the voting rights dilution is not necessarily negative, as the conversion allows more financial flexibility by removing contingent claims and restrictive conditions (Pinegar and Lease, 1986). We will test the value of convertibility by analyzing the convertible preferred share premium with time to conversion, to see how the value of convertibility is reflected in the convertible preferred share premium.

[6] This thought came from the invaluable discussions with Dr. Fan Yang.

In addition to dividend and convertibility, Fatemi and Krahnen (2000) in their empirical study of German preferred shares propose that the common share premium over preferred shares is positively related to ownership concentration (Fatemi and Krahnen, 2000). They focus on the supply side of the common share premium, where investors are competing for voting rights. They seem to be inspired by Zingales (1994), who argues that the market competition for limited voting rights is the major driver for the voting rights premium. The study by Fatemi and Krahnen (2000) helps us to develop another important hypothesis that when the management controls the company with large shareholdings, the premium of preferred shares decreases or vice versa. We believe the German case study may have implications for the Korean market.

However, we may flip this logic to the other direction. Since preferred shares lack voting rights while they provide higher dividend payout, a company's management with weak ownership control may temporarily halt dividend payments to trigger equity value in preferred shares. This suggests that lack of a controlling stake at a company creates an option to trigger equity value in preferred shares. Furthermore, the larger control imposes greater agency costs on the firm value (Jensen and Meckling, 1976). The private benefits to the largest shareholders increase along with shareholding stake. In this case, the premium of preferred shares should increase with the larger shareholding. We also consider this possibility in our hypothesis building below.

Issuance rationales for preferred shares

This study focuses on valuation of Korean convertible preferred shares to indirectly measure the values of dividend, voting rights and convertibility by estimating the convertible preferred share premium over the common shares (the convertible preferred share premium). A deeper look into issuance rationales would build more solid theoretical foundation for our

approach. From the previous literature, we found that tax benefits and corporate governance have been the major motivations for the management to issue preferred shares.[7] We review each rationale and suggest implications for our study on the valuation of Korean convertible preferred shares.

Tax benefits

Tax regulation changes have exerted significant influence on companies to issue preferred shares, by providing tax deductibles and redefining tax base. Regulators have actively used preferred shares as effective policy channels, providing strong tax incentives. By reviewing Korea tax code and market incidences, we found two cases which provided strong tax incentives; dividends received deduction and the 2014 dividend income tax.

As presented in Table 2.1, the Korean tax regime currently has dividends received deduction (KPMG, 2015). The dividends received deduction is designed to avoid double taxation on dividend income received by a company from another company. The dividend received deduction ranges from 30% to 100% depending on the shareholding percentage of the holding company. It may not be a coincidence that in Korea most of the preferred shares issuance are issued by conglomerates having holding company structures (Claessens et al., 2000). Because dividends are the major method of income transfer from subsidiaries to holding companies, the dividend received deduction would be attractive tax incentive for high dividend paying companies.

[7] Another persuasive issuance rational is to strengthen capital adequacy ratio of banks (Howe and Lee, 2006). From 1996, the Federal Reserve allowed banks to include preferred shares into the measurement of Tier 1 capital (Frischmann et al., 1999). Issuance of preferred shares by financial firms are beyond the scope of this study. In our samples, we excluded financial firms.

Table 2.1 Dividends received deduction in the Korean tax regime

Dividend from non-listed corporation		Dividend from listed corporation	
Shareholding	Deduction	Shareholding	Deduction
100%	100%	100%	100%
More than 50%, less than 100%	50%	More than 30%, less than 100%	50%
50% or less	30%	30% or less	30%

Source: KPMG

Furthermore, the Korean tax regime introduced the 2014 dividend income tax benefit to encourage firms' increased dividend payout. Before the 2014 dividend income tax benefit, the Korean tax regime combined interest income and dividend income. When the total income exceeds KRW20 million (c. C$22 thousand), comprehensive taxation with a higher tax rate up to the maximum of 38% was imposed. After the 2014 tax benefit, tax payers may separate the dividend income from the interest income with only 9% tax rate on dividends. Major beneficiaries of the 2014 dividend income tax benefit are the largest shareholders and the high net worth entities who exert significant influence on firms' dividend policies (Yonhap News, 2014). Since preferred shares structurally have higher dividends than common shares, such favorable tax policies have been tailwinds for preferred shares investment in Korea. However, the 2014 dividend income tax benefit has been closed without extension in 2017 after concerns that these regulations provide excessive benefits to the high net worth entities. This argument supports the proposition that the preferred shares are favorably traded by the high net worth entities and the largest shareholders, who have keen interests in reducing tax burdens.

Due to abundant literature in North America regarding the taxation of preferred shares, we analyze the tax benefit rationale using the American experience and suggest implications for

Korean cases. There are three historical incidences in the United States that we saw regulatory tailwinds to preferred shares issuance. First, the Life Insurance Company Income Tax Act of 1959 allowed insurance companies to actively invest into equity market through preferred shares, by relaxing conservative and restrictive capital regulations. The Act contributed to noticeable demand increase for new preferred shares issuance (Fischer and Wilt, 1968; Sorensen and Hawkins, 1981). Because of their hybrid nature, preferred shares have been used as supplements to high-yield bonds within which conservative asset management policies of life insurers were restricted.

Second, the U.S. Federal tax regulation permits 70% (85% in the past) of dividends income as deductibles for the corporate income tax (Fischer and Wilt, 1968; Sorensen and Hawkins, 1981; Fooladi and Roberts, 1986; Ravid et al., 2003). On the back of tax deductibles, effective corporate tax rate on the dividend income for the U.S. companies could be less than 14% (45 percent x (1-0.70)), which encouraged them to be active buyers of preferred shares (Fooladi and Roberts, 1986). Given the tax deductibles, researchers suggest high quality preferred shares are mostly held by corporations or institutions who are tax sensitive (Chen and Sauer, 1997). These tax-driven long-term investors tend to make the preferred shares more stable. This is in line with the dividend received deduction tax code in Korea, which also provides strong incentives in the issuance of preferred shares in Korea. The dividend received deduction tax code effectively addresses the weakness of the preferred shares compared to bonds whose interest expenses are deductible unlike preferred shares.

Furthermore, the U.S. tax authority introduced Tax Reform Act 1986 accounting rule change regarding foreign tax credit, which limited the tax favored status of debt but introduced new incentives to issue alternative financing instruments, preferred shares. In response to the rule

change, the U.S. Corporations substitute debt with preferred shares, which maintain the favored status regarding the foreign tax credit but share similar characteristics of debt (Callahan et al., 2001). Researchers confirm this rationale with an industry survey, where Coca-Cola informed the researchers that its main motivation for issuance of preferred shares was the foreign tax credit rule change (Collins and Shackleford, 1992). We see a similar tax policy in Korea, which discourages debt issuance by weakening tax exemption on interest expenses. Fatemi et al. (2002) observe that Korean firms with borrowing over 50% of their net worth are excluded from tax deduction of interest expenses. Firms have strategically responded to the tax incentive on the preferred shares.

M&A strategies, value of voting rights and agency cost

Convertible preferred shares have not been actively issued in North America, while many preferred shares in the international market have convertible features and are actively traded. We believe this gap between North American markets and international markets is mainly due to corporate governance concerns. La Porta et al. (2000) argue that agency costs and corporate governance are related and countries with less legal protection suffer greater agency costs. According to La Porta et al. (2000), countries with the Civil Law system like France tend to have weaker legal protection. Korean legal regime belongs to the Civil Law system in contrast to the Anglo-Saxon Common Law system.

In M&A, preferred shares can be used as anti-takeover measures with reduced service costs. Since convertible preferred shares have recoverable voting rights, potential M&A target management can effectively use the convertible preferred shares as an M&A defence and decrease the attractiveness of the target (Collins and Shackelford, 1992; Houston and Houston, 1990). Convertible preferred shares may function as a poison pill strategy when convertible

preferred shares are issued and held by the "friendly" investors (Davis, 1996). Yet, one notes that converted voting rights of preferred shares will remain minority to the controlling common shares and provide no meaningful value (Emanuel, 1983). In general, converted preferred shares consist of less than 20% of total shares outstanding, which may not be enough to exert significant influence on corporate actions.

In contrast to the previous discussions, some global companies like Samsung Electronics have controlling shareholders with less than 20% stakes[8], where even a relatively small portion of convertible preferred shares (i.e. 5-10% of total shares outstanding) may exert significant influence on the shareholders' meetings (Claessens et al., 2000; Lemmon and Lins, 2003). From studies on dual class listings across countries, Nenova (2003) finds that value of the voting rights is 48% of the firm value in Korea. In Korea, controlling shareholders control their firms with smaller stakes, while value of voting rights remains high enough.

This peculiar situation in Korea leads us to review this study's implications for agency cost theory. Using the 1998 Asian Crisis data, an empirical study on the stock return and the firm control ownership concludes that the stock returns are lower when the management has more control (Lemmon and Lins, 2003). The management with the higher degree of control has greater ability to take private benefits from minority shareholders (Zingales, 1994). Based on this, we reason that the agency cost will be greater for the firms with the larger block shareholding. Villalonga and Amit (2006) conclude that firm value is a decreasing function of management ownership of voting rights.

[8] As of September 2017, Samsung Life and other affiliated companies control Samsung Electronics with 20.0% stake.

It will be interesting to examine whether this agency cost theory will be also applicable to the convertible preferred shares premium in Korea. Davis (1996) argues that the convertibility of the convertible preferred shares is a swap contract that transfers wealth from the common shareholders to the preferred shareholders, and the swap contract dilutes the agency costs imposed on firm values. Al-Suhaibani et al. (2013) also support this perspective by proposing that the preferred shares reduce conflicts of interests by clearly assigning voting rights and dividends among shareholders. This allows us to expect the dilution of agency costs with convertible preferred shares. It is probable that this would expand the convertible preferred share premium as the dilution of agency costs will be applicable to the convertible preferred shares and the common shares. Examining this proposition is beyond the scope this study.

CHAPTER III. THEORETICAL ARGUMENTS AND HYPOTHESES

This research examines the difference in price of preferred shares and common shares of the same issuer. The unique nature of preferred shares in the Korean market makes this analysis interesting. As noted earlier, the three kinds of preferred shares in the Korean market pay dividends based on the dividends paid by common shares. As shown by Table 1.1 in Chapter I, preferred share dividends are either greater than or equal to common share dividends. The purpose of this research is to find what factors other than dividend payments affect the difference in share prices. This objective is interesting given that the most important benefits from common or preferred share ownership are the dividends. Financial theory suggests that the value of any financial asset is determined as the present value of all future cash flows. Dividends are the cash flows promised to common shares and preferred shares. Therefore, if all else are equal, the preferred dividend premium we observe in the Korean market should lead to a price premium. This argument leads to our first hypothesis.

Table 1.1 Three types of the preferred shares in Korea

Types	Representative	Market cap.	Dividend	Cumulative	Conversion
Old non-convertible preferred share	Samsung Electronics Preferred	C$42bn	Maximum [+9% of Face Value, Common Share Dividend per Share + 1% of Face Value of Common share]	No	No
New non-convertible preferred share	Hyundai Motor Preferred 2	C$4bn	Maximum [+2% of Face Value, Common Share Dividend per Share]	No	No
New convertible preferred share	Daesang Preferred Shares 3	N/A	Maximum [+3% of Face Value, Common Share Dividend per Share]	Yes	Yes

Hypothesis 1. The preferred dividend yield gap (preferred share yield minus the common share yield) is positively related to the price premium of convertible preferred shares over common shares.

Determining the value of common shares as the present value of all future dividend payments has been challenged by many arguments suggesting that common share prices may be temporarily affected by company specific or market-wide factors. The irrelevance theory of the Miller-Modigliani (1961) suggests that the dividend policy should not have any significant impact on the common share premium (Richardson and Thompson, 1986). Under this theory, if management pays dividends now or reinvests the cash in projects and pays dividend later, the investor should be indifferent to dividends under certain conditions. One of these conditions is the growth rate of the common shares. La Porta et al. (2000) argue that higher growth firms tend to pay less dividends delaying cash distribution to the future while pursuing current investment opportunities. If the firm retains the cash to invest in positive net present value projects, the share price will grow and the dividends that will be paid in the future will be higher. However, if the objective of holding common and preferred shares is long term, and the preferential dividend payment to preferred shares will continue with future dividend payments, then the growth rate of the common shares should be the same as the growth rate of preferred shares.

Another theory that affects the importance of dividends in determining the value of common shares is the clientele effect. As we have discussed in the tax effect section, corporations and institutions are major buyers of the preferred shares given the higher and stable income streams paid by preferred shares, and the tax advantages to preferred share dividends as opposed to interest from bonds. Another argument for higher dividend now as opposed to later is consistent with the famous statement; *"a bird in the hand is worth more than one in the bush"* (Black and Scholes, 1974). This argument suggests that shareholders prefer the certainty of receiving dividends now instead of the promise to receive dividends in the future. This clientele effect should have the same direction of hypothesis 1 that the higher dividend yield of the

preferred shares should lead to higher price premium for preferred shares. The preferred shares have covenants to guarantee more favorable dividends than the common shares.

On the other hand, Baker and Wurgler (2004) develop the "catering theory" which argues a reverse causality suggesting that "dividends are highly relevant to share price, but different directions at different times." Financial institutions pressure convertible preferred share issuers to pay higher dividends to compensate them for the weak potential of capital gains. Given the small size of preferred share issues in the market, active trading for short-term capital gains may not be feasible for financial institutions. Instead, some tax-exempt financial institutions will find higher yields of preferred shares attractive. This will make a "buy-and-hold" strategy an optimal strategy for the long-term institutional investors. Although the catering theory is disputable to some extant (DeAngelo et al., 2006), this theory may allow an opposite outcome to what hypothesis 1 predicts. This may be applicable to the convertible preferred shares premium given that in Korea the major demanders of the preferred shares are financial institutions like insurers or pension investors who are more focused on stable incomes rather than capital gains.

Lastly, Chay and Moon (2005) find an interesting result on the relation between dividend payments and common share premium. In their study, they find that dividend paying preferred shares showed premium before the 1998 Asian Financial Crisis, while they are traded in discounts after the 1998 Crisis. They explain these contrasting results based on the voting rights trigger clauses on preferred shares. As discussed before, dividend misses trigger the recovery of the voting rights for preferred shares. After the 1998 Asian Financial Crisis, many Korean companies experienced frequent dividend misses and saw their preferred shares recovering voting rights. Market seems to have provided voting rights premium on the preferred shares with

dividend misses. Unlike Chay and Moon (2005), we will test hypothesis 1 with this possibility using a continuous variable of the dividend yields rather than a dummy variable.

Hypothesis 2. Management control over voting rights may lead to a higher or lower price premium of preferred shares over common shares depending on whether the supply side effects are weaker or stronger than the effects of agency costs.

Hypothesis 2 is the result of the supply side theory of Zingales (1994). The supply side theory assumes that the managers compete with shareholders to maintain control[9]. When they have insufficient controlling shares, the managers provide higher premium to the voting shares. When the management have complete control of the firm, the voting premium decreases. Using this theory, Fatemi and Krahen (2000) suggest a firm's corporate governance issues, such as management control, exert significant influence on the valuation of preferred shares. When management controls a significant majority of voting rights, negotiating with minority shareholders of common shares is the only way for outsiders to increase their influence over management. Given the difficulty of such negotiations, management can issue common shares without risking loss of control. Therefore, the supply of preferred shares will be small. In contrast, when management does not have sufficient voting rights, management may consider convertible preferred shares to increase capital resources without risking a dilution of its control. This tendency will increase the supply of preferred shares and reduce the preferred share premium.

On the other hand, Jensen and Meckling (1976) suggest that the larger the block holding controlled by management the larger will be the agency costs consumed by management on

[9] We need to note that unlike North America in Korea the management tends to be identical to the largest shareholders.

perks and self-dealings (Linn and Pinegar, 1988). At the same time, preferred shares allow dividend arrearage and are subject to less default risks given its seniority to common shares. Therefore, the agency costs of management control will affect preferred shares to a lesser degree than common shares (Jensen and Meckling, 1976). Thus, the larger the block controlled by management the higher the preferred price premium. This is opposite to the result predicted by the supply side hypothesis explained earlier. In our OLS regression, we will test hypothesis 2 by focusing on the signal of the regression coefficients.

Hypothesis 3. The preferred share premium is positively related to the time remaining to conversion.

Convertible preferred shares are essentially common shares with a delay. Before conversion, they are preferred shares with no voting rights but receive preferential dividend payments. Therefore, if the dividend differential leads to a positive preferred share premium, we would expect that the longer the time to conversion the more benefits the preferred shareholders will have from their assets and the higher will be the premium. Based on this logic, the convertible preferred share premium will decrease as conversion approaches.

An interesting feature of some convertible preferred shares is that if dividends are in arrears, the preferred shares will become voting shares and conversion is delayed until the arrears dividends are paid. Therefore, convertible preferred shares have an option like feature by which management at its discretion can exercise the option of delaying conversion by delaying dividend payments. Management will exercise this option when it is advantageous to the company or disadvantageous to the preferred shareholders. As time to conversion approaches the value of this option will increase and it will increase the preferred share premium.

The Daesang preferred share 3 case study in Chart 3.1 demonstrates that the convertible preferred share premium increases as it approaches the conversion date and less time left to conversion. This suggests that the lack of voting rights and other factors that differentiate common shares from preferred shares are contributing significantly and negatively to a preferred share discount. With long time left before conversion, the voting right is deeply discounted. As there are less time left to the conversion, the voting right discount narrows and approaches to zero. This speculation may result in the opposite result to what hypothesis 3 predicts. We will revisit these contrasting logics with the OLS regression results for hypothesis 3.

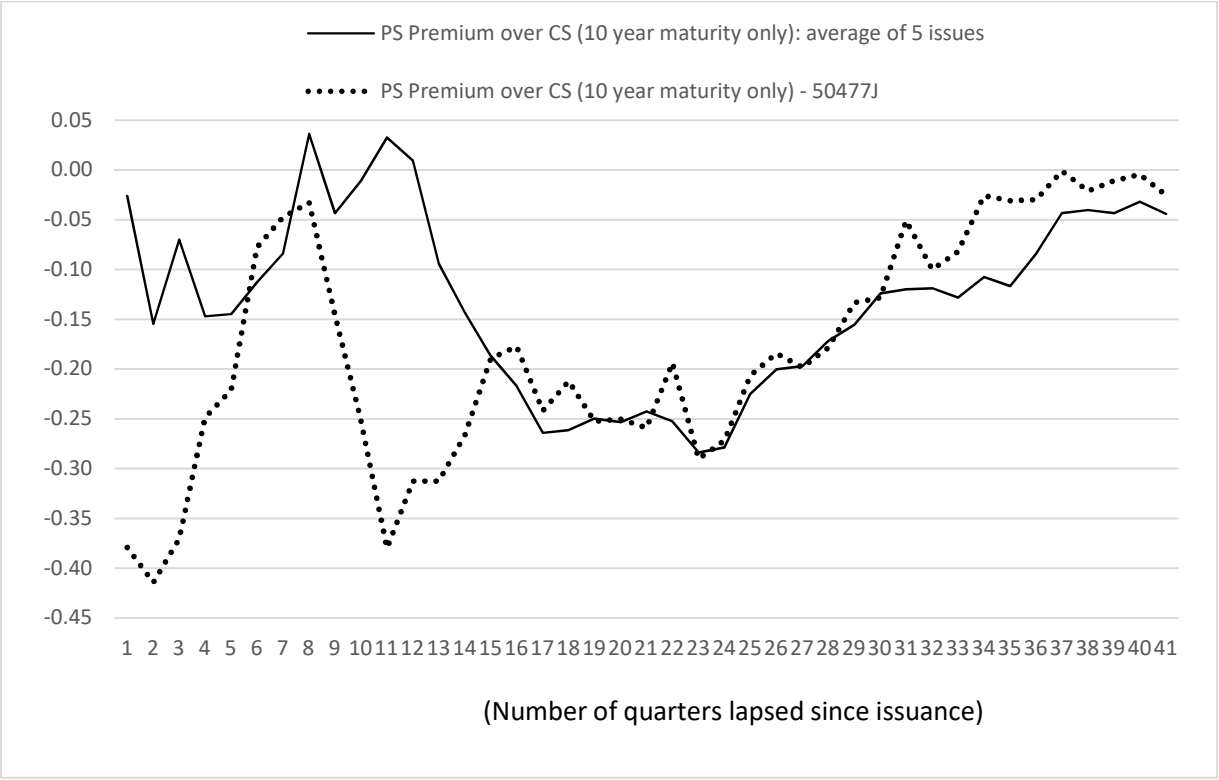

Chart 2.1 PS premium over CS - Average of 5 selected convertible preferred shares and Daesang Preferred Share 3

Chart 3.1 presents the convertible preferred share premium over the common share (PS Premium over CS) for 5 selected convertible preferred shares with the same cohort and 10-year time to conversion. The straight line is the average of the 5 selected convertible preferred shares. The dotted line is the premium of Daesang Preferred Share 3 (50477J) over Daesang common shares. The quarters lapsed since issued have values from 0 to 40.

Hypothesis 4. The preferred share premium is positively related to corporate leverage.

Emanuel (1983) emphasizes that preferred dividends may be paid in arrears without causing default risks. Firms with higher leverage will have weaker capability to pay dividends. While major differences between common shares and convertible preferred shares are lack of voting rights, convertibility and higher dividends, taking higher level of debt increases the risk of default or dividends going into arrears for preferred shareholders.

However, preferred shares dividends are more secure than common share dividends. First, some preferred dividends are cumulative, and all preferred dividends have priority of claims over common share dividends. Above all, all types of preferred shares have voting right recovery clauses when dividends are paid in arrears. This provides some cushions to cash flows of preferred shares, and an increase in the debt to capital ratio will affect common share price negatively by a larger degree than it affects preferred share price. This means that the preferred share premium should be higher with higher capital structure. Villupuram (2008) supports this view by showing that the Credit Default Swap (CDS) spreads do not show negative responses after the preferred share issuance and suggests that preferred shares provide some capital cushions to the firm's capital structure (Villupurum, 2008; Heinkel and Zechner, 1990). Kallberg et al. (2013) also provide additional evidence suggesting that the equity holders do not respond negatively to the issuances of preferred shares.

As further development of the agency cost theory, Jensen (1986) provides a persuasive theory arguing that the leverage increases firm value. His theory unfolds in two ways; 1) debt creation restrains firm managers by bonding them to pay out future cash flows, and 2) debt created during a hostile takeover effectively disciplines firm managers resulting into restructurings which are beneficial to firm values. We conjecture a similar result for the relation

between the leverage and the preferred share premium. We will examine Jensen's theory with hypothesis 4.

Hypothesis 5. The convertible preferred shares premium is negatively related to the market's general yield spread between AA- corporate bonds and treasury bonds.

The three-year yield spread is designed to measure the price of default risk in the market, which affects bond valuation. The increased default risks in the market leads into reduced capability for dividend payment. Delayed dividend payment to common shareholders will increase the dividend merit of the preferred shares and will be associated with the more premium of convertible preferred shares over common shares. The same effect will happen if the capacity to pay preferred dividends deteriorates because in this case the payment of common dividends will be worse by a bigger magnitude.

Hypothesis 6. The premium of convertible preferred shares over common shares is negatively related to market movements and sentiments (during up-markets the premium narrows while during down-markets the premium widens).

In an up market, investors are more focused on capital gains rather than dividend income. In a down market, investors seek income cushions rather than capital gain. Unlike North America, Korea's tax regime does not have capital gain tax while dividend income is taxed. This makes investing into a common share rather than a convertible preferred share a superior strategy in an up-market. Also, as common shares are often more liquid than convertible preferred shares, they have advantages in the up market.

Control variables

In addition to the variables related to the hypotheses, we include nine control variables in our regression equations: long-term growth, beta, liquidity, share buyback, interest rate environment and size. This would allow us to see a clearer relationship between the 6 main hypothesis variables and the convertible preferred shares premium. We use the trailing 5-year revenue growth to capture long-term growth. We calculate the 30-day beta of preferred shares to measure beta. We also introduced the relative liquidity ratio to measure liquidity of preferred shares relative to common shares. To control firm size, we used the natural logarithm of total assets (Shyu, 2013). Especially, the size variable will control far well-known issues such as 1) dividends are increasingly concentrated in a few large players (DeAngelo et al., 2006) and 2) due to public scrutiny, larger firms are faced with less agency costs (Shyu, 2013). To control the negative relation between the common share buyback and the preferred share premium, we added a dummy variable for the common share buyback (Dann, 1981).

Several control variables are used to capture year effects and the impact of macro shocks. Crisis are defined as any consecutive quarter returns of less than -5% market downturn. This effectively controls shocks from the crises including the 1998 Asian Financial Crisis (from the third quarter of 1999 to the fourth quarter of 2000), the 2003 Credit Card Crisis in Korea (from the second quarter of 2002 to the first quarter of 2003), and the 2008 Subprime Mortgage Crisis (from the first quarter of 2008 to the fourth quarter of 2008). During the crises, firms' cash flows are largely minimized while corporate governance factors remain intact. We used three time dummy variables to control the three crises in Korea.

CHAPTER IV. DATA AND MODELS

Previous literatures on the pricing divergence between the two similar assets often define the common share premium as Premium $_{CS\text{-}PS}$ = (Price $_{CS}$ – Price $_{PS}$)/ Price $_{PS}$ in line with approaches by Zingales (1994), Fatemi and Krahnen (2000) and Levy (1982). We expect the theoretical price of convertible preferred shares should be higher than the common shares focusing on higher dividend yield, dividend guarantee structure and convertibility, while voting rights may not be significant. In other words, this thesis differs from previous studies by not only focusing on voting rights but also other fundamental factors such as dividends and convertibility. We therefore set the convertible preferred shares premium as the dependent variable. The following is an equation that explains the convertible preferred shares premium:

Equation 2.1

Premium $_{PS\text{-}CS}$ = (Price $_{PS}$ - Price $_{CS}$)/ Price $_{CS}$

Unlike Fatemi and Krahnen (2000) and Zingales (1994), we do not subtract the dividend yield from the price premium. We take this approach to see the impact of the dividend yield differentials on the price premium. Instead, we conduct additional regression using quarterly dividend yield of preferred shares (QDYP) as a dependent variable to cross check whether there are statistically significant relations between the QDYP and independent variables other than dividend yield gaps.

As some researchers attempted, we have broken down the relative premium of convertible preferred shares into values of voting rights, convertibility, conversion delay option and dividend yield guarantee (Emanuel, 1983). In our equation, all of the values except conversion delay option have positive signs, while the values of voting rights and convertibility are discounted by the time remaining to conversion. We subtract the conversion delay option

from the value of convertibility as the conversion delay option is valuable to the issuers rather than holders. Because the values of voting rights, the convertibility and the dividend yield guarantee are invisible, we indirectly use the convertible preferred share premium to measure them (Nenova, 2003). The following is an equation to conceptualize the convertible preferred shares premium in the three theoretic components:

Equation 4.2

$\text{Premium}_{\text{PS-CS}}$ = f (dividend yield differential, voting rights, convertibility, conversion delay option, dividend guarantees, other factors)

Data

Using Thomson Reuters Datastream, we acquired a complete list of 278 preferred share issues that are traded on the Korean market between 1998 and 2016. However, due to missing data we dropped 182 issues. The remaining sample contains 96 preferred shares, which have identifiable stock codes and matching common shares. We excluded preferred shares issued by financial companies given different accounting, fiscal years, and financial structures and unique capital adequacy regulations (Frischmann, 1999; Callahan et al., 2001; Lemmon and Lins, 2003; Howe and Lee, 2006; Royal Bank of Canada, 2008; Bjuggren et al., 2007; Kallberg et al., 2013). Furthermore, financial institutions have used preferred shares issuance as part of financial restructurings, which is beyond this thesis's focus (Houston and Houston, 1990). To avoid overlapping, we excluded an ETF preferred share, Mirae Asset Tiger Preferred Stock ETF (KO:PTM).

Some researchers believe that preferred shares with premiums over common shares are outliers and exclude the preferred shares with premiums from their samples (Chay and Moon, 2005; Han, 2010; Jeong and Lee, 2013; Yun and Kim, 2016). However, we do not believe that

preferred shares with the premium over common shares are outliers. Han (2010) finds that 20% of his preferred shares samples show the preferred shares premium. Although voting rights have significant values in Korea, we believe there are values for dividend guarantees and convertibility which are unique to convertible preferred shares. In this thesis, we do not exclude the preferred shares with premiums over the common shares. Instead of removing all of the preferred shares trading in premium, we addressed outliers in the following manner.

To address outliers, we excluded 2 preferred shares with as we discovered data errors resulting from mishandling of stock splits and removed 11 preferred shares which have undergone major corporate restructurings. During major corporate restructurings, given their seniority to common shares, the prices of preferred shares remain intact while their common shares counterparts become worthless due to debt-to-equity swaps and/or capital reductions. These extraordinary situations lead into extremely high convertible preferred share premiums for these preferred shares. Also, to avoid data distortion due to the stale price of preferred shares, we have eliminated data points when preferred shares are not traded in the market. Some illiquid preferred shares have periods of non-trading, while their common shares continue trading. The non-synchronous trading often results in erroneous convertible preferred share premiums.

As presented in Table 4.1, after the data cleaning process, our data sample contains 83 preferred shares. Of the 83 preferred shares, we have 59 old preferred shares, 8 new non-convertible preferred shares and 16 new convertible preferred shares. Of the 83 preferred shares samples, there are 13 cumulative preferred shares in total; 7 in convertible preferred shares, 1 in new non-convertible preferred shares and 5 in old preferred shares. Compared with new non-convertible preferred shares and old preferred shares, new convertible preferred shares are more

likely to have cumulative dividends. The dividend cumulativeness seems to complement the lower dividend yields of new convertible preferred shares.

Table 4.1 Distribution of sample preferred shares

Types	Number of samples	Cumulative Dividend	Proportion of cumulative dividend
Old non-convertible preferred share	59	5	8.5%
New non-convertible preferred share	8	1	12.5%
New convertible preferred share	16	7	43.8%
Total	83	13	15.7%

To avoid survival bias, we included all of 16 convertible preferred shares until they are converted to common shares. The percentage of block holding shares is used as a proxy for the largest shareholder's control of firms (Chay and Moon, 2005; Shyu, 2013). We acquired details of block shareholding data and conversion schemes from quarterly filings of Korea public disclosure. After the 1998 Asian Financial Crisis, Korean public filings started including detailed information about shareholding structures and capital policy. The public filings disclose the shares of block shareholders aggregating the shares of largest shareholders and affiliated parties.[10] This allows us to use panel data from 1998 to 2016 for 19 years. The 19 years of time periods are long enough to observe all of the recent financial crises; the 1998 Asian Financial Crisis, the 2003 Credit Card Crisis in Korea and the 2008 Subprime Mortgage Crisis. Crises provide exogenous shocks to our data samples and allow us to more clearly observe fundamental changes (Lemmon and Lins, 2003). Ilina et al. (2014) argue that during the crises cash flows diminish while the values of controls remain intact. This allows us to clearly observe components of the convertible share premium.

[10] See dart.fss.or.kr (Quarterly filing → VII. Shareholders → 1. Largest shareholder and specially related persons)

Since we can capture significant changes in most variables on a quarterly basis, we have modified all variables to quarterly data. As seen in Appendix A, we have daily data available for preferred share premium (prem), beta (beta), relative liquidity (liq), market yield spread (yld) and market return (mkt). Except market return (mkt), we calculated daily ratios and then averaged them to produce quarterly data. For market return (mkt), we calculated quarterly average levels of market index and calculated their quarterly returns. For share buyback (dsbb), we calculated quarterly changes in shares outstanding and identified share buyback with reduced shares outstanding. We have annual data for dividend yield gap (dyg), long-term growth (grth) and leverage (lvrg) as they are from financial statements. For the dividend yield gap, we applied year end dividends to corresponding years' interim quarters. And then we calculated daily dividend yield gaps and averaged them to produce quarterly data. For long-term growth, we have calculated 5-year trailing compound annual growth rate of total sales. For leverage, we acquired annual debt-to-capital ratio from Datastream and used them for interim quarters.

Models

We have two models for OLS regressions: Model 1 with the preferred share premium as a dependent variable and Model 2 with the QDYP as a dependent variable. In addition to the main model 1 which measures the valuation of the convertible preferred share premium, we attempt to measure the costs of equities and introduce quarterly dividend yield of preferred shares (QDYP) and quarterly dividend yield of common shares (QDYC) as seen in Equations 4.3 and 4.4. Since the QDYP has endogeneity with the dividend yield gap, we replaced it with the QDYC.

Equation 4.3

QDYP = PS dividend at year end/ average PS price over a quarter

Equation 4.4

QDYC = CS dividend at year end/ average CS price over a quarter

For each dividend payment, we have chosen the quarters to span the dividend payment date. Since most payment dates of Korean firms are in April, we used this dividend to calculate the QDYP and QDYC for quarter 4 of the previous year and quarters 1, 2 and 3 of the current year. We run two OLS regressions on the dependent variable Premium $_{PS\text{-}CS}$ and QDYP using 6 independent variables and 9 control variables. In our panel data, we controlled firm fixed effects and also considered the time effects using three time dummy variables of crises.

In Model 1, we have set preferred share premium as a dependent variable for three different preferred shares groups. Equation 8 is designed to analyze the determinants of the convertible preferred share premium. We modify equation 8 to analyze new non-convertible preferred shares and old non-convertible preferred shares. Therefore, we drop time to conversion (ttc) variable for the two non-convertible preferred shares as they do not have convertibility.

Equation 4.5

$$\text{Convertible Preferred Shares Premium}_{PS\text{-}CS} = c + X_1 \cdot \text{Yield Gap}_{PS\text{-}CS} + X_2 \cdot \text{Growth}_{5yr\ rev} + X_3 \cdot \text{Beta}_{30\text{-}D\ PS\ beta} + X_4 \cdot \text{Liquidity}_{rel\ liq} + X_5 \cdot \text{Size}_{lnTotal\ Asset} + X_6 \cdot \text{Block Holding} + X_7 \cdot \text{Share Buyback} + X_8 \cdot \text{Leverage} + X_9 \cdot \text{Time to conversion} + X_{10} \cdot \text{Rate Environment}_{DRATE} + X_{11} \cdot \text{Market Yield}_{3yr\ CB\text{-}Trs} + X_{12} \cdot \text{Market}_{index} + X_{13} \cdot \text{Crisis}_{DAFC} + X_{14} \cdot \text{Crisis}_{DCCC} + X_{15} \cdot \text{Crisis}_{DSMC} + X_{16} \cdot \text{CML}_{DCML} + \epsilon$$

In Model 2, we have set the quarterly dividend yield of preferred Shares (QDYP) as a dependent variable and replaced the dividend yield gap with the quarterly dividend yield of common shares (QDYC). Model 2 conjectures that the dividend yield of the common share is an important independent variable for the dividend yield of the preferred share. Equation 4.6 presents Model 2 for convertible preferred shares QDYP. As done in Model 1, we modify Equation 4.6 to analyze new non-convertible preferred shares and old non-convertible preferred shares dropping time to conversion variable given their lack of convertibility.

Equation 4.6

$$\text{Convertible Preferred Shares QDYP}_{PS} = c + X_1 \cdot \text{QDYC}_{CS} + X_2 \cdot \text{Growth}_{5yr\ rev} + X_3 \cdot \text{Beta}_{30\text{-}D\ beta} + X_4 \cdot \text{Liquidity}_{rel\ liq} + X_5 \cdot \text{Size}_{lnTotal\ Asset} + X_6 \cdot \text{Block Holding} + X_7 \cdot \text{Share Buyback} + X_8 \cdot \text{Leverage} + X_9 \cdot \text{Time to conversion} + X_{10} \cdot \text{Rate Environment}_{DRATE} + X_{11} \cdot \text{Market Yield}_{3yr\ CB\text{-}Trs} + X_{12} \cdot \text{Market}_{index} + X_{13} \cdot \text{Crisis}_{DAFC} + X_{14} \cdot \text{Crisis}_{DCCC} + X_{15} \cdot \text{Crisis}_{DSMC} + X_{16} \cdot \text{CML}_{DCML} + \epsilon$$

(H1) Dividend Yield Gap: To measure relative dividend merits of the preferred shares over the common shares, we calculated dividend yield gap, and the following equation explains the dividend yield gap:

Equation 4.7

$$\text{Dividend yield gap} = \text{DPS}_{PS}/\ \text{Price}_{PS} - \text{DPS}_{CS}/\ \text{Price}_{CS}$$

Sureth (2012) suggests that large insider ownership leads into higher dividend payout as far as concerned with corporate governance. We control this by using dividend yield gap ratio rather than dividend per share itself. On average, dividend yield gaps are positive as the dividend yields for the preferred shares tend to be higher than ones for the common shares (Stickle, 1991).

In Korean market, dividends are often paid on an annual basis. Assuming dividends are expected for 1 year forward, we use year-end dividends for interim quarters. We calculated daily dividend yield gaps and averaged them over a quarterly basis.

(H1-C1) Growth: We calculated firms' long-term growth using the trailing 5-year compound annual growth rate (CAGR) of sales. We used sales as they are more stable and are relatively free from accounting differences. To capture the true long-term growth characteristics and to avoid lagging effects, we used the trailing 5-year sales growth rate. This will control whether dividend yield gaps reflect growth characteristics. La Porta et al. (2000) argue that high growth firms pay lower dividends while low growth firms make high dividends.

(H1-C2) Beta: We introduced beta to control whether the dividend yield gaps reflect risk premium of the preferred shares. We calculated the 30-day trailing beta of preferred shares using following formula:

Equation 4.8

30-D Preferred share beta = 30-D Covariance (Price $_{PS}$ % daily change, Index $_{KOSPI}$ % daily change)/ 30-D Variance (Index $_{KOSPI}$ % daily change)

(H1-C3) Liquidity: Amihud (2002) suggests that illiquid stocks have illiquid premium. Previous illiquidity measures such as the bid-ask spread (Amihud and Mendelson, 1988) and the daily ratio of absolute stock return to its dollar volume (Amihud 2002) are not applicable to our study given limited data availability. To control the illiquidity premium, we instead calculated our own measure of the relative liquidity of preferred shares. We calculated liquidity of the preferred shares relative to the liquidity of common shares as follows:

Equation 4.9

Relative liquidity = LCS (liquidity of CS = volume of CS / total CS outstanding)

LPS (liquidity of PS = volume of PS / total PS outstanding)

The ratio RL (relative liquidity) = LPS/LCS

(H1-C4) Size: Given the fact that preferred shares are often issued by large conglomerates in Korea, we added a size variable to capture the size effect. We measure the size with natural log of total assets (Shyu, 2013). Since the total assets are financial statement data, we used year-end data for interim quarters.

(H2) Block holding: Block holding variable means percentage ownership of the largest controlling group. Korea public filing system, DART[11] requires public firms to disclose block holding structures of largest shareholders including individuals and institutions. Korean block holders consist not only of individuals but also of corporates, not-for-profit institutions and financial institutions (Claessens et al., 2000). The DART provides full detail quarterly data of block holders from the first quarter of 2000. Compared with other countries, controlling block holders of Korean companies tend to have smaller percentages of ownership for example 20-30% but effectively control the firms with cross shareholding of the small stakes at the firms (Claessens et al., 2000). This makes difficult for us to determine the thresholds for control such as 33% or 50%. Therefore, we do not use a dummy variable with the control threshold, rather use a continuous variable.

(H2-C1) Share buyback: Share buyback variable controls the potential negative relation between the common share buyback and the preferred share premium. Dann (1981) identifies the significant relations between the common share buyback and related bonds and preferred shares.

[11] Data Analysis, Retrieval and Transfer

This is also related to the supply side theory of Zingales (1994). Reduced supply of the common shares due to share buyback may lead into more intense competition for controlling firms. We added a dummy variable for the share buyback.

(H3) Time to conversion: We used time to conversion to measure the time varying value of convertibility. Convertible preferred shares have pre-determined conversion dates such as 3, 5, and 10 years. We calculate time to conversion with the following equation.

Equation 4.10

Time to conversion = -10 + lapsed number of quarters × 0.25

For instance, time to conversion data should range from -10 to 0.

However, when dividends are paid in arrear, the conversion is also delayed. Some low quality and leveraged companies have large positive maturities like +8. This also causes heteroscedasticity as the excessive conversion delay costs lower the convertible preferred share premium with extended time to conversion. Yet, this problem was effectively handled when we removed 11 preferred shares outliers with major corporate restructurings. During the restructuring, common shares lose much of its values by restructuring measures such as debt-to-equity swap or capital reduction. On the other hand, preferred shares are left intact given its lack of voting rights and seniority to common shares. This extraordinary case makes the value of preferred shares remaining untouched while having the common shares values almost worthless. It inflates the convertible preferred share premium over the common shares to extremely high numbers.

(H4) Leverage: We used debt-to-capital ratio rather than debt-to-equity ratio to measure firm leverage. The more inclusive denominator effectively addresses firm leverage. Since we

only have year-end balance sheet data, we used year-end leverage ratio for interim quarters. Datastream does not provide calculated debt-to-capital ratio on a quarterly basis. Anyhow, leverage ratios for interim quarters are in the middle of estimation adjustment, and thus tend to be rather inaccurate. Datastream calculated annual debt-to-capital ratio with the following equation:

Equation 4.11

Debt-to-capital ratio = (Long Term Debt + Short Term Debt + Current Portion of Long Term Debt) / (Total Capital + Short Term Debt + Current Portion of Long Term Debt) × 100

(H5) Market yield spread: We calculated the market yield spread between 3-year AA-grade corporate bond yield and 3-year Treasury bond yield. Korea's central bank of Korea provides the daily market corporate bond spread data. We used the 3-year spread to capture the mid-term perspective of corporate risk premium, which the market currently perceives. We first calculated the market yield spread in daily and then averaged them in quarterly.

Equation 4.12

$$\text{Market Yield Spread} = \text{Yield}_{\text{3 yr AA- corporate bond}} - \text{Yield}_{\text{3 yr treasury bond}}$$

(H5-C1) Interest rate environment: To control the different interest rate environment over the long time-series, we introduced a dummy variable for the interest rate environment. The average interest rate for the 3 year corporate bond yields from 1998 to 2016 is 5.18%. We set the dummy variable 1 when the quarterly interest rate is above 5.18%, otherwise set it as 0.

(H6) Market return: We used quarterly returns of Korea stock exchange index KOSPI. Using market index KOSPI, we averaged daily index to quarter levels and calculated their quarterly returns as follows:

Equation 4.13

Market return = (Quarter average of Index $_{Q1}$ - Quarter average of Index $_{Q2}$)/

Quarter average of Index $_{Q2}$

(Control variable) Crisis: We controlled year effects by including three control dummy variables for crises. The crises periods are 1, while non-crises periods are 0. We defined the crises period as less than -5% quarter-on-quarter market downturns. This effectively covers the 1998 Asian financial Crisis, the 2002 Credit Card Crisis in Korea and the 2008 Subprime Mortgage Crisis.

CHAPTER V. RESULTS

Descriptive statistics

As seen in Table 5.1 summary statistics, we found in Korea the preferred share premium over the common shares is -18% on average and -41% on median. A probable reason for the negative premium is that Korean tax regime does not impose taxes on capital gains while dividend incomes are taxed. Amoako-adu et al. (1992) find abnormal returns before rescindment of capital gain tax exemptions in Canadian market[12] and conclude the capital gains tax exerted significant influence on the stock market. In our sample, preferred shares on median pay 0.95% higher dividend yield than common shares, while having lower liquidity ratio of 0.80 on median.[13] Assuming that more liquid stocks are better positioned in capital gains potential, the 0.95% higher dividend yield advantage was mostly offset by the income tax. As of 2017, Korean dividend income tax has an effective rate 15.4%[14]. This may coincide with some portion of the 18% discount of the preferred shares against the common shares. Rosenthal and Young (1990) find a similar phenomenon that the mispricing between Royal Dutch and Shell was due to the tax scheme difference between the U.K. and the Netherlands.

Table 5.1 Summary statistics – Premium as a dependent variable

Table 5.1 presents sample statistics for the principle variables for the preferred share premium regressions. We grouped preferred shares into four groups. Panel A shows all preferred shares. Panel B shows new convertible preferred shares. Panel C shows new non-convertible preferred shares. Panel D shows old non-convertible preferred shares. The dependent variable for Model 1 is the preferred share premium over common shares (prem). The dependent variable for Model 2 is the quarterly dividend yield of preferred shares (qdyp). The two models have following dependent variables; dividend yield gap between preferred shares and common shares (dyg), quarterly dividend yield of common shares (qdyc), 5 year trailing revenue compound growth rate (grth), beta of preferred

[12] In May 1985, Canadian government introduced capital gain exemption of $500,000. After two years of the capital gain exemption in June 1987, the exemption limit was reduced to $100,000, making the tax saving ineffective.
[13] In Korea, dividend yields for preferred shares are not as great as North America. In North America, preferred shares dividend yields are more than twice of common shares (Stickle, 1991).
[14] An exact formula is dividend income × (Income tax 14% + Residence tax 1.4%). This is applicable up to KRW20mn (C$22,000) dividend income bracket. If the dividend income is greater than KRW20mn, a higher tax rate of 25% is imposed.

shares measured in 30 day beta of the preferred shares (beta), relative liquidity of the preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), leverage measured in debt-to-capital (lvrg), time to conversion (ttc), market yield spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld) and market return measured in Korean index KOSPI's quarterly return (mkt). Time to conversion is only relevant to new convertible preferred shares.

	Mean	SD	5th pctl.	25th pctl.	Median	75th pctl.	95th pctl.	Obs.
A. All preferred shares								
prem	-0.1801	1.0798	-0.6979	-0.5539	-0.4130	-0.2010	0.7486	4,884
dyg	0.0131	0.0228	-0.0078	0.0000	0.0095	0.0222	0.0483	4,884
qdrp	0.0314	0.0335	0.0000	0.0052	0.0237	0.0468	0.0915	4,746
qdrc	0.0177	0.0210	0.0000	0.0030	0.0122	0.0243	0.0567	4,784
grth	0.0797	0.1333	-0.1014	0.0090	0.0766	0.1356	0.2814	4,330
beta	0.5087	0.4559	-0.1420	0.2162	0.4721	0.7746	1.2735	4,854
liq	3.6038	15.2257	0.0998	0.3653	0.8066	2.0708	13.2992	4,884
size	9.3158	0.8104	8.0645	8.7213	9.2396	9.8375	10.8112	4,856
block	0.3962	0.1659	0.1584	0.2615	0.3746	0.4940	0.7147	4,810
lvrg	0.4259	0.2413	0.0138	0.2666	0.4586	0.5784	0.7429	4,821
yld	0.0081	0.0056	0.0029	0.0042	0.0069	0.0101	0.0147	5,470
mkt	0.0320	0.1142	-0.1533	-0.0310	0.0233	0.0752	0.3053	5,470
B. New convertible preferred shares								
prem	0.8976	2.2234	-0.3948	-0.1928	-0.0412	0.5949	6.6294	476
dyg	-0.0011	0.0196	-0.0337	-0.0005	0.0001	0.0056	0.0186	476
qdrp	0.0186	0.0270	0.0000	0.0000	0.0100	0.0289	0.0579	470
qdrc	0.0163	0.0181	0.0000	0.0000	0.0118	0.0248	0.0513	508
grth	0.0667	0.1250	-0.1374	-0.0013	0.0830	0.1370	0.2633	403
beta	0.3583	0.4559	-0.3455	0.1097	0.3510	0.6115	1.1149	463
liq	5.1099	25.9822	0.0511	0.2310	0.7277	2.2442	17.3579	476
size	8.9726	0.6203	7.9706	8.4222	9.0445	9.3540	9.9668	475
block	0.4691	0.1509	0.2566	0.3731	0.4466	0.5821	0.7257	464
ttc	-3.9633	3.0636	-9.2500	-6.2500	-3.5000	-1.5000	0.2500	457
lvrg	0.4171	0.1932	0.0707	0.2440	0.4622	0.5497	0.6694	474
yld	0.0088	0.0059	0.0033	0.0044	0.0080	0.0111	0.0147	590
mkt	0.0314	0.1200	-0.1590	-0.0328	0.0249	0.0877	0.3053	590
C. New non-convertible preferred shares								
prem	-0.0904	1.7142	-0.6989	-0.5843	-0.4326	-0.3159	0.8288	491
dyg	0.0157	0.0205	-0.0076	0.0000	0.0154	0.0247	0.0489	491
qdrp	0.0368	0.0288	0.0000	0.0145	0.0349	0.0546	0.0871	475
qdrc	0.0205	0.0139	0.0000	0.0090	0.0197	0.0286	0.0469	475
grth	0.0929	0.1418	-0.1904	0.0062	0.0841	0.1723	0.3361	457
beta	0.4782	0.4987	-0.2226	0.1696	0.4570	0.8060	1.2466	485
liq	2.1364	5.7929	0.0512	0.3855	0.7963	1.7130	6.9603	491
size	9.8009	0.9251	8.5900	8.8234	9.8075	10.5881	11.1661	497
block	0.3910	0.1434	0.1911	0.2597	0.4033	0.4741	0.6240	485
lvrg	0.4315	0.2197	0.0135	0.2846	0.4945	0.5811	0.6999	493
yld	0.0078	0.0055	0.0029	0.0042	0.0065	0.0099	0.0146	535
mkt	0.0282	0.1084	-0.1533	-0.0310	0.0231	0.0700	0.2280	535

D. Old preferred shares								
prem	-0.3223	0.5694	-0.7066	-0.5656	-0.4446	-0.2576	0.3943	3,917
dyg	0.0145	0.0229	-0.0017	0.0017	0.0107	0.0233	0.0500	3,917
qdrp	0.0323	0.0344	0.0000	0.0056	0.0245	0.0476	0.0951	3,801
qdrc	0.0176	0.0220	0.0000	0.0028	0.0113	0.0232	0.0595	3,801
grth	0.0795	0.1330	-0.0927	0.0104	0.0736	0.1323	0.2729	3,470
beta	0.5304	0.4467	-0.0966	0.2338	0.4894	0.7930	1.2878	3,906
liq	3.6048	14.2281	0.1255	0.3880	0.8178	2.1018	13.4622	3,917
size	9.2957	0.7874	8.0597	8.7212	9.2552	9.8222	10.6643	3,884
block	0.3881	0.1681	0.1562	0.2597	0.3604	0.4930	0.7243	3,861
lvrg	0.4263	0.2492	0.0118	0.2666	0.4508	0.5791	0.7710	3,854
yld	0.0080	0.0056	0.0029	0.0042	0.0069	0.0101	0.0147	4,345
mkt	0.0325	0.1142	-0.1533	-0.0310	0.0233	0.0752	0.3053	4,345

On average, both the old non-convertible preferred shares and the new non-convertible preferred shares have negative premiums of -9% and -32%, respectively. However, when we look only at the convertible preferred shares, the convertible preferred share premium is surprisingly at a positive level of 89%. This is in line with our original expectation when we introduced the convertible preferred share premium with Equation 4. Zingales (1994) also finds a similar phenomenon where convertible non-voting shares generally sell premiums with respect to voting shares in Italy. Lease et al. (1983) find that some dual-class shares have shown positive premium when the dual-class shares included voting preferred shares. In median, the premium is relatively high at -4% for convertible preferred shares, while the premiums both for new non-convertible preferred shares and old non-convertible preferred shares remain low at -43% and -44%, respectively. The two non-convertible preferred shares show similar discount levels in previous studies in Korea (Chay and Moon, 2005; Han, 2010). However, this thesis provides new evidence that the convertible preferred shares have higher premium than non-convertible preferred shares. This suggests there are significant values for the convertibility and the dividend guarantees, as we conceptualize before in Equation 4.2.

Assuming the degree of yield guarantees among the three types of the preferred shares is similar without much difference,[15] the old non-convertible preferred shares and the new non-convertible preferred shares differ from the new convertible preferred shares in terms of convertibility and voting rights. Based on naïve estimation, this means that corporate governance related values like convertibility and voting rights are estimated more than 40% on median. These significant values for the voting rights and convertibility are not unusual in other markets (Lease et al., 1983; Ilina et al., 2014). Equations 5.1, 5.2 and 5.3 explain the value of voting right and dividend guarantees using differences between common shares, convertible preferred shares and non-convertible preferred shares.

In addition to the corporate governance values, dividend cumulativeness is also a very important factor for the valuation of the preferred shares. As explained in Equation 5.1, assuming all else equal, the only difference between value of common shares and value of non-convertible preferred shares is value of voting right V(VR). Again, assuming all else equal, the difference (Equation 5.2) between value of common shares and value of convertible preferred shares is V(VR) minus value of dividend cumulativeness V(CMLD). If we subtract Equation 5.2 from Equation 5.1, we get value of dividend cumulativeness V(CMLD) in Equation 5.3, which is the difference between value of convertible preferred shares and value of non-convertible preferred shares. As explained in Table 5.1, we calculated the premiums of convertible preferred shares and non-convertible preferred shares as -4% and -43% on median, respectively. We know that the value of voting right V(VR) is 43% according to Equation 5.1 and the value of dividend cumulativeness V(CML) is -4% - (-43%) = 39%.

[15] While we have seen majority of convertible preferred shares are cumulative, other types are mostly non-cumulative. This would make the convertible preferred shares even more valuable.

Equation 5.1

V(VR) = Value of common shares – Value of non-convertible preferred shares

Equation 5.2

V(VR) – V(CMLD) = Value of common shares – Value of convertible preferred shares

Equation 5.3

V(CMLD) = Value of convertible preferred shares – Value of non-convertible preferred shares

Table 5.1 Summary statistics – Premium as a dependent variable

Table 5.1 presents sample statistics for the principle variables for the preferred share premium regressions. We grouped preferred shares into four groups. Panel A shows all preferred shares. Panel B shows new convertible preferred shares. Panel C shows new non-convertible preferred shares. Panel D shows old non-convertible preferred shares. The dependent variable for Model 1 is the preferred share premium over common shares (prem). The dependent variable for Model 2 is the quarterly dividend yield of preferred shares (qdyp). The two models have following dependent variables; dividend yield gap between preferred shares and common shares (dyg), quarterly dividend yield of common shares (qdyc), 5 year trailing revenue compound growth rate (grth), beta of preferred shares measured in 30 day beta of the preferred shares (beta), relative liquidity of the preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), leverage measured in debt-to-capital (lvrg), time to conversion (ttc), market yield spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld) and market return measured in Korean index KOSPI's quarterly return (mkt). Time to conversion is only relevant to new convertible preferred shares.

	Mean	SD	5th pctl.	25th pctl.	Median	75th pctl.	95th pctl.	Obs.
A. All preferred shares								
prem	-0.1801	1.0798	-0.6979	-0.5539	-0.4130	-0.2010	0.7486	4,884
dyg	0.0131	0.0228	-0.0078	0.0000	0.0095	0.0222	0.0483	4,884
qdrp	0.0314	0.0335	0.0000	0.0052	0.0237	0.0468	0.0915	4,746
qdrc	0.0177	0.0210	0.0000	0.0030	0.0122	0.0243	0.0567	4,784
grth	0.0797	0.1333	-0.1014	0.0090	0.0766	0.1356	0.2814	4,330
beta	0.5087	0.4559	-0.1420	0.2162	0.4721	0.7746	1.2735	4,854
liq	3.6038	15.2257	0.0998	0.3653	0.8066	2.0708	13.2992	4,884
size	9.3158	0.8104	8.0645	8.7213	9.2396	9.8375	10.8112	4,856
block	0.3962	0.1659	0.1584	0.2615	0.3746	0.4940	0.7147	4,810
lvrg	0.4259	0.2413	0.0138	0.2666	0.4586	0.5784	0.7429	4,821
yld	0.0081	0.0056	0.0029	0.0042	0.0069	0.0101	0.0147	5,470
mkt	0.0320	0.1142	-0.1533	-0.0310	0.0233	0.0752	0.3053	5,470
B. New convertible preferred shares								
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qdrc	0.0163	0.0181	0.0000	0.0000	0.0118	0.0248	0.0513	508
grth	0.0667	0.1250	-0.1374	-0.0013	0.0830	0.1370	0.2633	403
beta	0.3583	0.4559	-0.3455	0.1097	0.3510	0.6115	1.1149	463

liq	5.1099	25.9822	0.0511	0.2310	0.7277	2.2442	17.3579	476
size	8.9726	0.6203	7.9706	8.4222	9.0445	9.3540	9.9668	475
block	0.4691	0.1509	0.2566	0.3731	0.4466	0.5821	0.7257	464
ttc	-3.9633	3.0636	-9.2500	-6.2500	-3.5000	-1.5000	0.2500	457
lvrg	0.4171	0.1932	0.0707	0.2440	0.4622	0.5497	0.6694	474
yld	0.0088	0.0059	0.0033	0.0044	0.0080	0.0111	0.0147	590
mkt	0.0314	0.1200	-0.1590	-0.0328	0.0249	0.0877	0.3053	590
C. New non-convertible preferred shares								
prem	-0.0904	1.7142	-0.6989	-0.5843	-0.4326	-0.3159	0.8288	491
dyg	0.0157	0.0205	-0.0076	0.0000	0.0154	0.0247	0.0489	491
qdrp	0.0368	0.0288	0.0000	0.0145	0.0349	0.0546	0.0871	475
qdrc	0.0205	0.0139	0.0000	0.0090	0.0197	0.0286	0.0469	475
grth	0.0929	0.1418	-0.1904	0.0062	0.0841	0.1723	0.3361	457
beta	0.4782	0.4987	-0.2226	0.1696	0.4570	0.8060	1.2466	485
liq	2.1364	5.7929	0.0512	0.3855	0.7963	1.7130	6.9603	491
size	9.8009	0.9251	8.5900	8.8234	9.8075	10.5881	11.1661	497
block	0.3910	0.1434	0.1911	0.2597	0.4033	0.4741	0.6240	485
lvrg	0.4315	0.2197	0.0135	0.2846	0.4945	0.5811	0.6999	493
yld	0.0078	0.0055	0.0029	0.0042	0.0065	0.0099	0.0146	535
mkt	0.0282	0.1084	-0.1533	-0.0310	0.0231	0.0700	0.2280	535
D. Old preferred shares								
prem	-0.3223	0.5694	-0.7066	-0.5656	-0.4446	-0.2576	0.3943	3,917
dyg	0.0145	0.0229	-0.0017	0.0017	0.0107	0.0233	0.0500	3,917
qdrp	0.0323	0.0344	0.0000	0.0056	0.0245	0.0476	0.0951	3,801
qdrc	0.0176	0.0220	0.0000	0.0028	0.0113	0.0232	0.0595	3,801
grth	0.0795	0.1330	-0.0927	0.0104	0.0736	0.1323	0.2729	3,470
beta	0.5304	0.4467	-0.0966	0.2338	0.4894	0.7930	1.2878	3,906
liq	3.6048	14.2281	0.1255	0.3880	0.8178	2.1018	13.4622	3,917
size	9.2957	0.7874	8.0597	8.7212	9.2552	9.8222	10.6643	3,884
block	0.3881	0.1681	0.1562	0.2597	0.3604	0.4930	0.7243	3,861
lvrg	0.4263	0.2492	0.0118	0.2666	0.4508	0.5791	0.7710	3,854
yld	0.0080	0.0056	0.0029	0.0042	0.0069	0.0101	0.0147	4,345
mkt	0.0325	0.1142	-0.1533	-0.0310	0.0233	0.0752	0.3053	4,345

In our sample, there are significant values for the voting rights and the cumulative dividends with opposite signs. Previous literature focus on the value of voting rights, but this thesis provides new evidence for the cumulative dividends. This mathematical approach allows us to explain the wide gap between the value of convertible preferred shares and non-convertible preferred shares. In our regression, we add the cumulative variable, but it has multicollinearity problem with other dummy variables. To address the multicollinearity, in Chapter VI Robustness

Checks, we will run separate regressions on the sample data grouping them into the two groups; the cumulative and the non-cumulative.

In Charts 3.1, 5.1 and 5.2, we have drawn the convertible preferred shares premium to the common shares against the time to conversion. For a fair comparison, we have selected 5 convertible preferred shares with the same cohort and time to conversion of 10 years. It is interesting that the convertible preferred share premium first drops down to a -30-40% level and then gradually rises back to a zero level. As presented in Chart 5.1 and Chart 5.2, this interesting pattern repeats in individual cases of the 5 selected convertible preferred shares. Unfortunately, the current literature does not provide a clear theory about this phenomenon. A possible scenario is that the value of the convertibility and voting rights are discounted by time to conversion. As the convertible preferred shares are approaching to the conversion time, both the convertibility and the voting rights are getting more valuable, pushing the convertible preferred share premium away from negative territories. This may explain the positive slope observed from quarter 23 (-5 years) to quarter 40 (0 years).

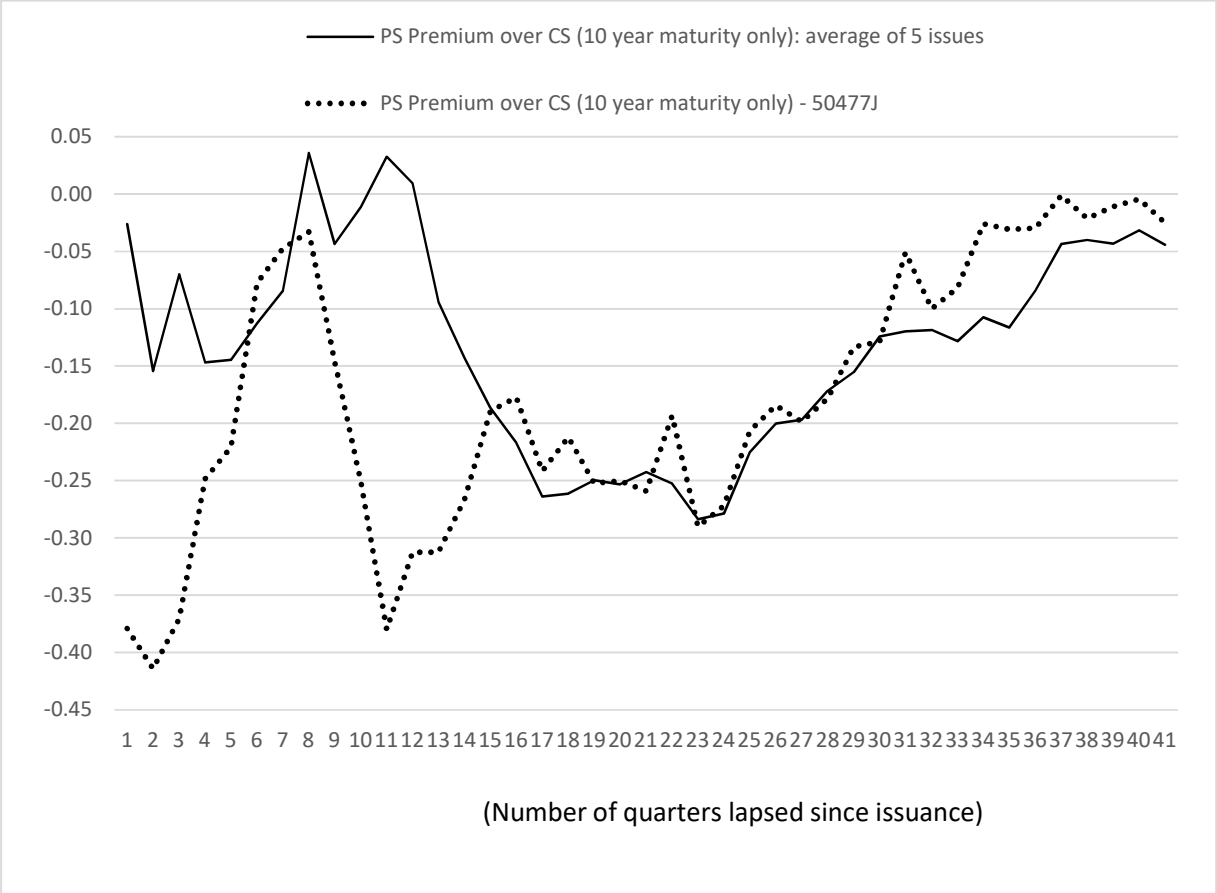

Chart 3.1 PS premium over CS - Average of 5 selected convertible preferred shares and Daesang Preferred Share 3

Chart 3.1 presents the convertible preferred share premium over the common share (PS Premium over CS) for 5 selected convertible preferred shares with the same cohort and 10-year time to conversion. The straight line is the average of the 5 selected convertible preferred shares. The dotted line is the premium of Daesang Preferred Share 3 (50477J) over Daesang common shares. The quarters lapsed since issued have values from 0 to 40.

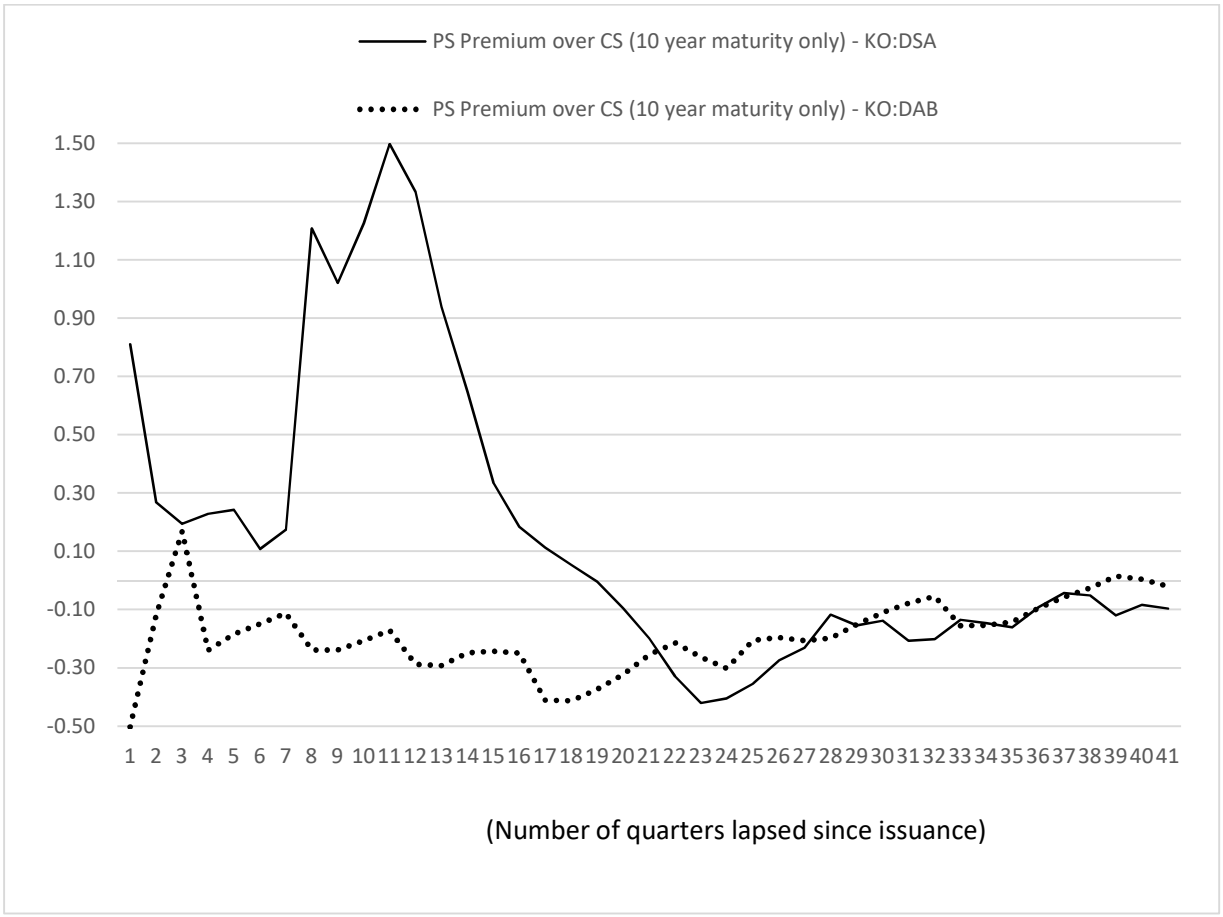

Chart 5.1 PS premium over CS - Premium of Farmsco Preferred Share and Daesang Preferred Share 2

Chart 5.1 presents the convertible preferred share premium over the common share (PS Premium over CS) for 5 selected convertible preferred shares with the same cohort and 10-year time to conversion. The solid line is the premium of Farmsco Preferred Share (KO:DSA) over Farmsco common share. The dotted line is the premium of Daesang Preferred Shares 2 (KO:DAB) over Daesang common shares. The quarters lapsed since issued have values from 0 to 40.

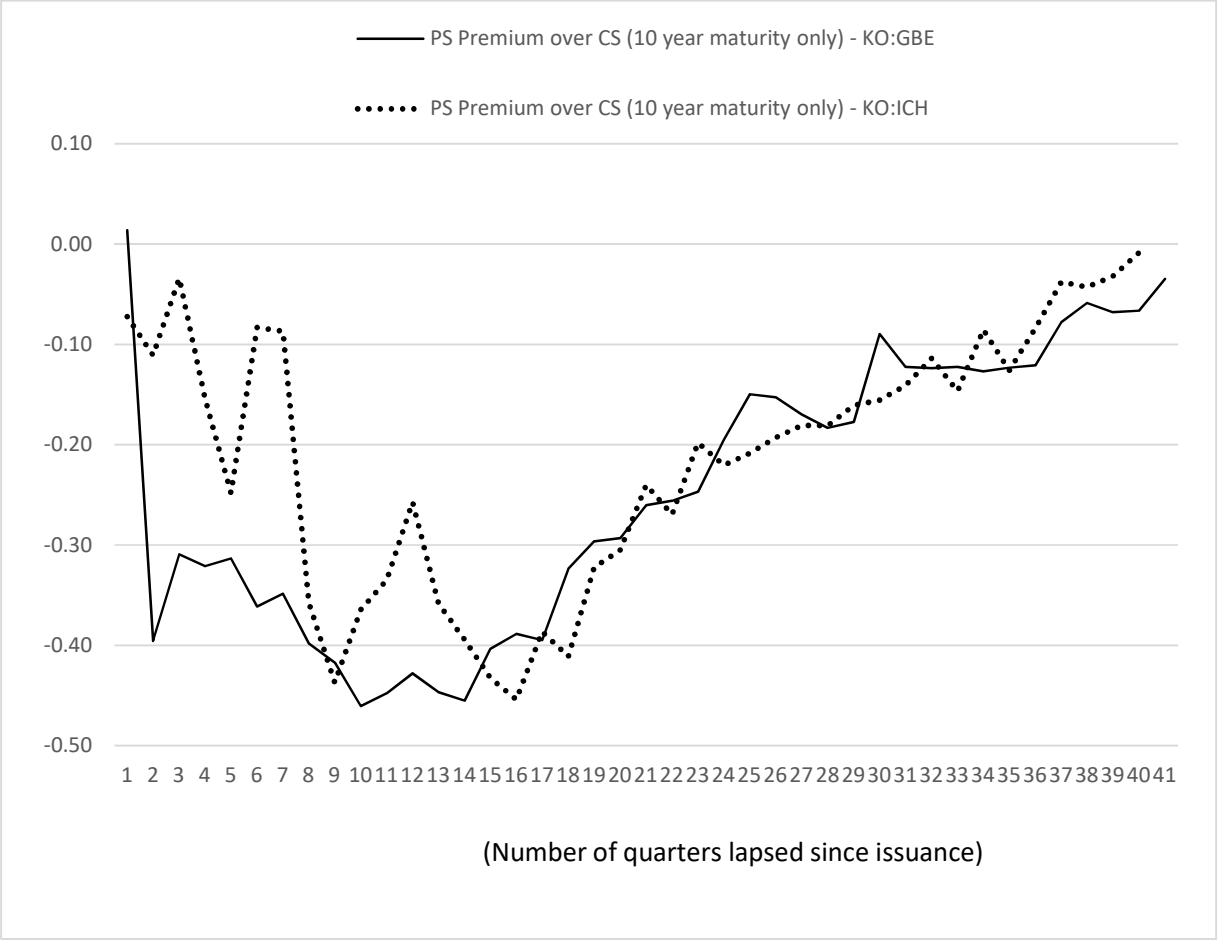

Chart 5.2 PS premium over CS - Premium of Sebang Preferred Share 2 and Hyundai Steel Preferred Share

Chart 5.2 presents the convertible preferred share premium over the common share (PS Premium over CS) for 5 selected convertible preferred shares with the same cohort and 10-year time to conversion. The solid line is the premium of Sebang Preferred Share 2 (KO:GBE) over Sebang common share. The dotted line is the premium of Hyundai Steel Preferred Share (KO:ICH) over Hyundai Steel common share. The quarters lapsed since issued have values from 0 to 40.

OLS regression results – PS premium as a dependent variable

As seen in Table 5.2 and 5.3, we tested our six hypotheses using the OLS regression method and found that three out of six hypotheses have shown statistically significant coefficients within 95% confidence intervals. It is worth to note that the three hypotheses 1 (dyg), 3 (ttc) and 4 (lvrg) are corporate level related, suggesting strong evidence against the traditional Miller-Modigliani and Miller-Scholes irrelevance theories. We believe this study opens many

doors for the ongoing corporate finance discussions. Our model on convertible preferred shares has shown satisfactory adjusted R-squares of 0.889 and F-statistics of 13.49. This suggests that our model successfully explains the variations of the preferred share premium and fits well to the data sets.

Table 5.2 OLS regression results - Premium as a dependent variable

Table 5.2 presents OLS regression estimates for Model 1 – premium as a dependent variable. The dependent variable is the preferred share premium. The independent variables are dividend yield gap between preferred shares and common shares (dyg), 5 year trailing revenue compound growth rate (grth), beta of preferred shares measured in 30 day beta of the preferred shares (beta), relative liquidity of the preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), dummy variable for the share buyback (dsbb), time to conversion (ttc), leverage measured in debt-to-capital (lvrg), dummy variable for the rate environment (drate), market yield spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld), market return measured in Korean index KOSPI's quarterly return (mkt), dummy variable for the 1998 Asian Financial Crisis (dafc), dummy variable for the 2002 Credit Card Crisis in Korea (dccc) and dummy variable for the 2008 Subprime Mortgage Crisis (dsmc). Each column represents regressions for four groups: (1) all preferred shares, (2) new convertible preferred shares, (3) new non-convertible preferred shares and (4) old preferred shares. It must be noted time to conversion (ttc) is only applicable to regression (2) given its convertibility. Given multicollinearity of dividend cumulativeness (dcml), we dropped dcml.

	(1)	(2)	(3)	(4)
	All	New Convertible	New Non-Convertible	Old Non-Convertible
VARIABLES	prem	prem	prem	prem
dyg	-4.8124***	-11.0384***	-25.4451***	-2.9477***
	(-8.172)	(-3.303)	(-7.043)	(-6.990)
grth	0.0212	-0.0582	-0.6633	-0.1238*
	(0.220)	(-0.110)	(-0.957)	(-1.757)
beta	0.0032	0.0120	-0.0952	0.0071
	(0.117)	(0.115)	(-0.637)	(0.351)
liq	0.0047***	0.0324***	0.0216	0.0018***
	(5.666)	(9.635)	(1.400)	(3.070)
size	-0.1253**	-0.4033	0.4682	-0.1996***
	(-2.047)	(-1.139)	(1.403)	(-4.420)
block	-0.9123***	0.6081	-9.8743***	-0.2993***
	(-7.255)	(0.818)	(-10.413)	(-3.413)
dsbb	0.03	0.0053	0.2780*	-0.0409*
	-1.021	(0.038)	(1.955)	(-1.855)
ttc		0.0945***		
		(4.123)		
lvrg	0.0737	1.9312***	2.7443***	-0.1613***
	(0.873)	(4.587)	(2.883)	(-2.741)
drate	-0.0183	-0.2347*	0.4064**	-0.0359
	(-0.556)	(-1.700)	(2.096)	(-1.497)
yld	-1.9007	0.6773	9.1105	-3.7710**
	(-0.781)	(0.075)	(0.670)	(-2.094)
mkt	-0.5838***	-0.2435	-2.6580***	-0.3872***
	(-3.933)	(-0.419)	(-3.154)	(-3.560)
dafc	0.1984***	0.1686	1.7051***	-0.0068
	(2.639)	(0.570)	(4.151)	(-0.122)

dccc	0.0229	0.1471	0.3160	0.0230
	(0.324)	(0.580)	(0.808)	(0.438)
dsmc	-0.1791***	-0.1106	-1.1640***	-0.0726*
	(-3.081)	(-0.521)	(-3.448)	(-1.695)
Constant	1.4062**	3.9824	-1.9543	1.8277***
	(2.488)	(1.238)	(-0.621)	(4.391)
Observations	4,182	370	443	3,351
Firm fixed effects	Yes	Yes	Yes	Yes
F-stat	15.53	13.49	18.29	12.55
Adjusted R-squared	0.619	0.889	0.532	0.346

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.3 Correlation

Table 5.3 presents correlation between the principle variables; the preferred share premium over common shares (prem), dividend yield gap between preferred shares and common shares (dyg), quarterly dividend yield of preferred shares (qdyp), quarterly dividend yield of common shares (qdyc), 5-year trailing revenue growth (grth), beta of preferred shares measured in 30 day beta of the preferred shares (beta), relative liquidity of the preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), dummy variable for share buyback (dsbb), leverage measured in debt-to-capital (lvrg), time to conversion (ttc), A dummy variable for the market rate environment (drate), market yield spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld), market return measured in Korean index KOSPI's quarterly return (mkt), dummy variable for the 1998 Asian Financial Crisis (dafc), dummy variable for the 2002 Credit Card Crisis (dccc) and dummy variable for the 2008 Subprime Mortgage Crisis (dsmc). We add * to indicate the 5% significance of the correlations.

Panel A: All preferred shares

	prem	dyg	qdrp	qdrc	grth	beta	liq	size	block	dsbb	lvrg	drate	yld	mkt	dafc	dccc	dsmc	dcml
prem	1																	
dyg	-0.1802*	1																
qdrp	-0.0637*	0.6333*	1															
qdrc	0.0911*	0.1799*	0.7446*	1														
grth	-0.0602*	0.0539*	0.1578*	0.1967*	1													
beta	-0.1197*	0.0668*	-0.027	-0.1193*	0.0678*	1												
liq	0.1225*	-0.0964*	-0.0790*	-0.0258	-0.0344*	-0.0475*	1											
size	-0.2239*	0.1448*	0.0633*	-0.0681*	0.1986*	0.3670*	-0.0772*	1										
block	0.1276*	-0.0484*	0.0235	0.0676*	-0.0098	-0.2527*	0.1419*	-0.2494*	1									
dsbb	0.0049	0.0434*	0.0577*	0.0347*	-0.0213	-0.018	-0.0362*	0.1159*	-0.0733*	1								
lvrg	-0.0127	0.0412*	0.0045	-0.0234	0.0865*	0.1523*	0.0425*	0.2372*	-0.1750*	-0.0645*	1							
drate	-0.0065	0.0496*	0.1388*	0.1758*	0.1594*	0.0247	-0.0564*	-0.1150*	-0.1382*	-0.0794*	0.1203*	1						
yld	-0.0134	0.0964*	0.1093*	0.0958*	0.0935*	0.0242	-0.0228	-0.0469*	-0.0560*	-0.0385*	0.0748*	0.5313*	1					
mkt	-0.0450*	0.0428*	-0.0252	-0.0613*	0.029	0	0.0023	-0.0311*	-0.0437*	0.0102	0.0377*	0.1289*	-0.0875*	1				
dafc	0.0298*	0.0812*	0.1420*	0.1422*	0.0416*	0.0331*	-0.0163	-0.0475*	-0.0823*	-0.0325*	0.0681*	0.2059*	0.0989*	-0.3411*	1			
dccc	0.0261	-0.0672*	0.0512*	0.1059*	0.0520*	0.0321*	-0.0148	-0.0408*	-0.0385*	-0.0253	0.0134	0.2064*	-0.0539*	-0.2580*	-0.0424*	1		
dsmc	-0.0147	-0.0139	-0.0261	-0.0204	0.0470*	0.018	-0.0129	0.0147	0.0187	-0.0803*	0.022	0.2424*	0.4099*	-0.3198*	-0.0498*	-0.0499*	1	
dcml	-0.0028	-0.0627*	-0.0197	0.0169	-0.1017*	-0.0922*	-0.0360*	-0.1366*	0.1163*	-0.0175	0.0502*	0.0197	0.0166	0.0018	0.0078	-0.0007	0.0068	1

Panel B: New Convertible preferred shares

	prem	dyg	qdrp	qdrc	grth	beta	liq	size	block	dsbb	ttc	lvrg	drate	yld	mkt	dafc	dccc	dsmc	dcml
prem	1																		
dyg	0.1473*	1																	
qdrp	0.3516*	0.4396*	1																
qdrc	0.3555*	-0.2493*	0.5102*	1															
grth	-0.0286	0.018	0.1387*	0.2739*	1														
beta	-0.1870*	0.1019*	-0.0972*	-0.1589*	-0.1259*	1													
liq	0.1498*	-0.1663*	-0.0721	0.0741	-0.0074	-0.1256*	1												
size	-0.4176*	0.1136*	-0.1840*	-0.4029*	0.0481	0.2972*	-0.1092*	1											
block	0.5469*	0.1696*	0.2703*	0.2418*	0.0759	-0.2492*	0.2698*	-0.4898*	1										
dsbb	0.0801	0.0419	0.0895	0.1177*	0.1441*	-0.0719	0.013	0.0268	0.1717*	1									
ttc	-0.021	0.0979*	-0.1588*	-0.3276*	0.0136	0.0796	-0.072	0.1695*	-0.0444	0.0396	1								
lvrg	-0.4018*	-0.047	-0.2338*	-0.3062*	0.0951	0.1166*	-0.0668	0.5556*	-0.3316*	-0.0583	0.1618*	1							
drate	-0.1591*	-0.1092*	-0.0568	0.0096	0.0318	0.1374*	-0.0537	0.0864	-0.3269*	-0.2096*	-0.2206*	0.0134	1						
yld	-0.0586	-0.1027*	-0.033	0.0318	0.0543	0.0676	0.008	0.0562	-0.0809	-0.0802	-0.0526	0.0285	0.4827*	1					
mkt	-0.0384	0.0275	-0.0226	-0.0059	-0.0079	0.0045	0.0609	-0.0094	-0.0198	0.0021	-0.0243	0.0048	0.0833*	-0.1369*	1				
dafc	-0.053	-0.1737*	-0.0541	0.0759	-0.0201	0.0626	-0.0227	0.04	-0.1927*	-0.0772	-0.1350*	0.0422	0.1903*	0.0788	-0.3646*	1			
dccc	-0.0207	-0.0253	-0.0072	0.0345	-0.0511	0.0753	-0.0234	0.0151	-0.1702*	0.0481	-0.0194	-0.0726	0.1936*	-0.0877*	-0.2801*	-0.0545	1		
dsmc	-0.0212	-0.0144	-0.0399	-0.041	0.1376*	0.0042	-0.0357	0.0369	0.084	-0.0899*	-0.0022	0.0444	0.2218*	0.4024*	-0.3380*	-0.0624	-0.0635	1	
dcml	-0.4139*	0.0451	-0.1848*	-0.3328*	-0.2798*	0.0773	-0.1469*	0.1023*	-0.1894*	-0.1525*	-0.0092	0.3070*	-0.0622	-0.0117	0.0037	0	-0.0532	0	1

Panel C: New Non-Convertible preferred shares

	prem	dyg	qdrp	qdrc	grth	beta	liq	size	block	dsbb	lvrg	drate	yld	mkt	dafc	dccc	dsmc	dcml
prem	1																	
dyg	0.3389*	1																
qdrp	0.2264*	0.8522*	1															
qdrc	0.1498*	0.2861*	0.6692*	1														
grth	0.006	0.0537	0.0245	0.0569	1													
beta	0.0938*	0.1517*	0.0449	0.1808*	0.2358*	1												
liq	0.0612	0.1029*	0.0938*	0.0188	0.0519	0.2061*	1											
size	0.3273*	0.3754*	0.2118*	0.1876*	0.1482*	0.5381*	0.2311*	1										
block	0.2627*	0.1375*	0.0802	0.0414	0.1830*	0.3981*	0.0879	0.4545*	1									
dsbb	0.0474	0.036	0.0979*	0.1340*	0.3028*	0.0056	0.0964*	0.1070*	0.0161	1								
lvrg	0.2336*	0.0495	0.1287*	0.1835*	0.3791*	0.2837*	0.0703	0.4610*	0.6559*	0.0669	1							
drate	0.1780*	0.0512	0.0608	0.0475	0.5266*	0.1302*	0.0203	0.0969*	0.2318*	0.2551*	0.1741*	1						
yld	0.0679	0.1004*	0.1246*	0.0743	0.2561*	0.086	0.0156	0.0188	0.1051*	0.0999*	0.1084*	0.5408*	1					
mkt	0.0673	0.0974*	0.1369*	0.1605*	0.0921*	0.1009*	0.0105	0.0229	0.0516	0.014	0.0408	0.1108*	0.1027*	1				
dafc	0.2325*	0.2088*	0.1681*	0.0662	0.1210*	0.1112*	0.0157	0.0775	0.1474*	0.0704	0.0209	0.2142*	0.1079*	0.3466*	1			
dccc	0.0889*	0.017	0.0697	0.1720*	0.2307*	0.0826	0.0249	0.0561	0.0921*	0.0913*	0.0259	0.2142*	0.0446	0.2597*	0.0409	1		
dsmc	0.0456	0.0548	0.0645	0.0202	0.0635	0.0448	0.0033	0.047	0.023	0.1549*	0.0801	0.2490*	0.4142*	0.3192*	0.0475	0.0475	1	
dcml	0.0671	0.0894*	0.1672*	0.2298*	0.2017*	0.2370*	0.0767	0.4102*	0.5820*	0.1323*	0.7424*	0.018	0.0136	0.0174	0.0016	0.0016	0.0018	1

In contrast to Hypothesis 1, on average, dividend yield gap is negatively associated with the convertible preferred share premium over the common shares. The regression result is statistically significant within a 99% confidence interval and has a negative coefficient of -11.0384 with t-value of -3.303. Furthermore, all of the regressions for each group's preferred shares have shown statistically significant coefficients within 99% confidence intervals. This result seems contradictory to traditional finance theory, where higher cash flow from given asset leads into a higher price of the asset.

Unfortunately, we do not have solid theoretical arguments for this surprising result. In our best attempt, we can think of two explanations for the result. First, Chay and Moon (2005) find that a dummy variable for dividend payment has a negative relation with the preferred share premium after the 1998 Asian Financial Crisis. As explained before, the preferred shares have voting rights recovery clause when the issuer omits dividends. The recovery of voting rights

significantly raises the preferred share premium. The large negative coefficient of -11.0384 supports this explanation. This result is consistent in regressions for all other types of preferred shares.

Our reading on the "catering theory" of Baker and Wurgler (2004) suggests another explanation. In the framework of the catering theory, the high dividend yield attracts long-term investors focusing on income rather than capital gains. They continue to demand higher dividends for the preferred shares in compensation for lower price of preferred shares compared to common shares. In some countries, preferred shares are mainly traded by financial institutions. In Sweden, non-voting shares are mostly owned by pension managers who do not focus on capital gains but are concerned with dividend yields (Bjuggren et al., 2007, Allen et al., 2000). Preferred shares effectively serve fixed interest investors in Australia, who lack an access to a significant corporate bond market (Davis, 1996). Like other international markets, Korean financial institutions may be the main clients of the preferred shares given its tax exemption.

For Hypothesis 2, we have tested whether there are any significant relations between the preferred share premiums and the control of firms. The regression does not have significant coefficient for the convertible preferred shares. In contrast to the convertible preferred shares, other two types of the non-convertible preferred shares have shown significant coefficients. We found opposite regression results for the other two types of preferred shares support this scenario. In line with previous research Fatemi and Krahen (2000) and Zingales (1994), we have a result indicating that the size of the block holding shares is negatively associated (t-values of -10.413 and -3.413) with the other two types of non-convertible preferred share premium. The result is statistically significant within 99% confidence intervals. This means that the relation between the ownership and the preferred share premium can be better explained by the supply side

competition theory of Zingales (1994) rather than the agency cost theory. Unlike our regression, the agency cost theory should have shown a positive coefficient indicating that there are greater agency costs with the larger block holding shares.

We have three explanations about this insignificance for the convertible preferred shares and significance for the other two types regarding the block holding variable. First, management block holding variable is not significant for the convertible preferred shares probably due to its convertibility, which allows them to behave as if they are common shares since issued. Second, there may be curvilinear relation between the ownership control and the convertible preferred share premium. Several scholars including McConnell and Servaes (1990), Ilina et al. (2014) and Seifert et al. (2005) indicate the curvilinear relation between the ownership and variables related to firm values. This study's OLS regression may be incapable to handle the potential curvilinear relations. Third, Chay and Moon (2005) also have insignificant coefficients between the preferred share premium and the block holders, and they argue that this result is probably due to the misalignment between the ownership and the firm control. However, this cannot explain the significant coefficients for regressions on the two non-convertible preferred shares.

Contrary to our expectation in Hypothesis 3, the time to conversion is positively associated with the convertible preferred share premium with coefficient of 0.0945 and t-stat 4.123. The regression is statistically significant within a 99% confidence interval. As seen in Chart 1.1 and 1.2, the preferred share premium first declines as the time to conversion decreases. And then the premium recovers to zero. This suggests that we have mixed results depending on when you start investing into the convertible preferred shares. However, on average, the convertible preferred share premium increases with less time remaining to the conversion. It

means the convertibility has values to the convertible preferred shareholders and is discounted to time.

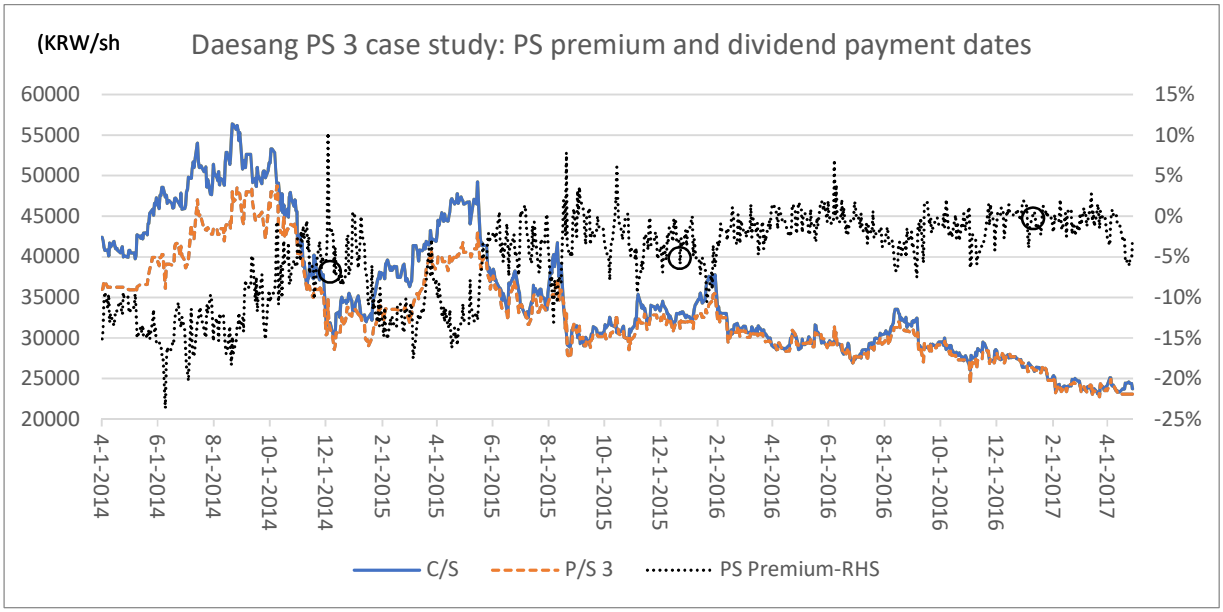

Chart 1.1 Daesang Preferred share 3 case study: Premium and Ex-dividend dates

Chart 1.1 presents 3 years of time series data of the convertible preferred share premium of a major Korean food manufacturing company Daesang. Along with the time series data, we highlighted ex-dividend dates for the last three years until Daesang Preferred Share 3's conversion in April 2017. We plotted three price information; Daesang common share price (C/S), Daesang Preferred Share 3 price (P/S 3) and Daesang Preferred Share 3's premium over the common share (PS Premium-RHS). Prices are in Korean won per share, while the convertible preferred share premium is in percentage.

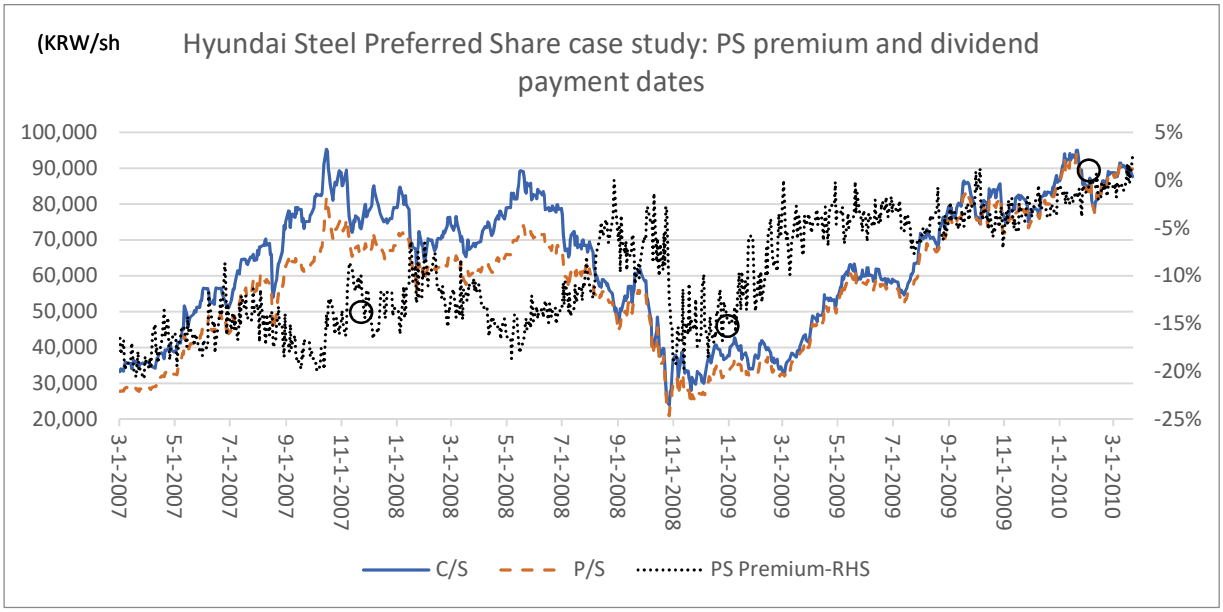

Chart 1.2 Hyundai Steel Preferred Share case study: Premium and Ex-dividend dates

Chart 1.2 presents 3 years of time series data of the convertible preferred share premium of a major cyclical steel maker Hyundai Steel. Along with the time series data, we highlighted ex-dividend dates for the last three years until Hyundai Steel Preferred Share's conversion in March 2010. We plotted three price information; Hyundai Steel common share price (C/S), Hyundai Steel Preferred Share price (P/S) and Hyundai Steel Preferred Share's premium over the common share (PS Premium-RHS). Prices are in Korean won per share, while the convertible preferred share premium is in percentage.

In line with our expectation in Hypothesis 4, the leverage variable has shown a significant coefficient of 1.9312 with t-stat of 4.587 within 99% confidence intervals. Rather than weakening debt serviceability, the increased leverage made the convertible preferred shares more valuable. The increased leverage made the convertible preferred shares more attractive investment as they are not considered debt and have more flexibility in cash outflow. Jen at el. (1997) argue that financially distressed firms issue the convertible preferred shares given its less financial burden than debts and consequentially lower risk of defaults. As suggested by Fischer and Glenn (1968), firms use preferred shares as a substitute for debt financing with a belief of "some leverage is better than none." Jensen (1986) and Barclay and Holderness (1989) create theories supporting the positive relation between the asset price and the leverage. Our finding

about the positive relation between the leverage and the preferred share premium provides additional evidence on these theories.

On the other hand, it is also probable that the value of the convertible preferred shares declined less than the common shares, widening the gap between them. This is seen in the 11 preferred shares where we removed from our sample because of major financial restructurings. Given the seniority to common shares, during the financial restructurings the values of the preferred shares remain intact while their common shares became worthless.

For Hypothesis 5, the market yield spread variable does not have a significant coefficient for regression of the convertible preferred shares. The dummy variable for the market interest has a weak correlation with the convertible preferred share premium with 90% significance. However, it is very interesting that regressions of old preferred shares have shown statistically significant results (coefficient -3.7710 and t-stat -2.094). In line with the result of Hypothesis 2, the result for Hypothesis 5 supports that the convertible preferred shares are more like equity, while the non-convertible preferred shares have strong characteristics of bonds. In other words, non-convertible preferred shares respond more sensitively to credit related variables given their bondness, while convertible preferred shares remain isolated from the credit side variables. As also discussed above, further research on the differences between convertible preferred shares and non-convertible preferred shares will be a very interesting research area.

Regarding to Hypothesis 6, we do not find statistically significant result for the convertible preferred shares. However, non-convertible preferred shares and old preferred shares have shown statistically significant results with 99% confidence intervals (coefficient -2.6580 and -0.3872, respectively). This suggests that common shares on average are adept in the up-market, while the bond-like preferred shares like non-convertible preferred shares and old

preferred shares effectively provide cash flow cushions in the down-market. Furthermore, lack of liquidity in convertible preferred shares seems to make them less efficient momentum players in the up-markets. As seen in Hypothesis 2 and 5, we continue to see the bond-equity dichotomy based on convertibility make significant influence on the relation between the preferred share premium and independent variables.

(Control variable) Crisis dummy variables do not have significant regression coefficients. Instead, liquidity variable shows significant coefficient of 0.0324 within a 99% confidence interval with t-stat of 9.635. This is opposite to the prediction by the illiquidity premium argument of Amihud (2002). It means the more liquid the preferred shares the higher premium it has over the common shares. As explained before, this is probably due to the capital tax exemption in Korean market, where being easy to sell is one of the important trading characteristics.

This is in line with our finding in Hyundai Steel Case study in Chart 1.2. Amihud (2002) observed the "flight-to-liquidity" during the October 1987 Crisis, where market participants switch from less liquid to more liquid stocks. During the crisis, investors sell the less liquid convertible preferred shares and instead buy the more liquid common shares. This provides additional evidence to Amihud's study on the "flight-to-liquidity."

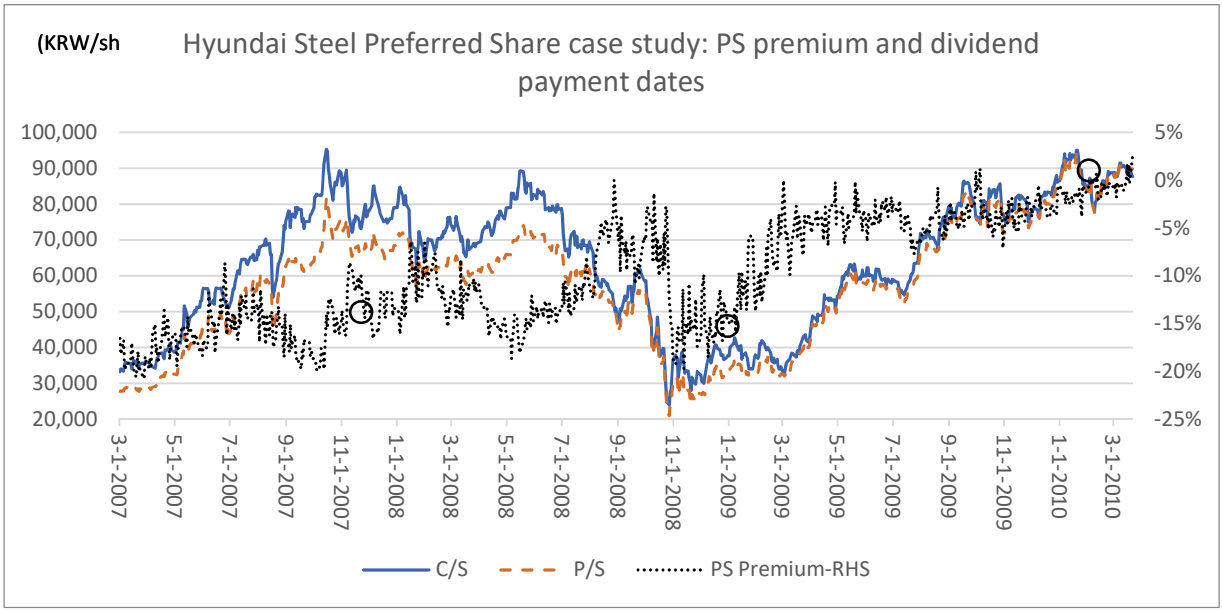

Chart 1.2 Hyundai Steel Preferred Share case study: Premium and Ex-dividend dates

Chart 1.2 presents 3 years of time series data of the convertible preferred share premium of a major cyclical steel maker Hyundai Steel. Along with the time series data, we highlighted ex-dividend dates for the last three years until Hyundai Steel Preferred Share's conversion in March 2010. We plotted three price information; Hyundai Steel common share price (C/S), Hyundai Steel Preferred Share price (P/S) and Hyundai Steel Preferred Share's premium over the common share (PS Premium-RHS). Prices are in Korean won per share, while the convertible preferred share premium is in percentage.

OLS regression results – QDYP as a dependent variable

As seen in Table 5.4, we run another OLS regression on the quarterly dividend yield of preferred Shares (QDYP) as a dependent variable instead of the preferred share premium. As defined in Model 2 with Equation 9, we attempt to examine relations between the cost of equities and our principle variables. While Model 1 has F-stat of 13.49 and R squared of 0.889, Model 2 has F-stat of 12.68 and R squared of 0.542. Model 1 seems to be a slightly better model. We run regressions with four groups of the preferred shares; (1) all preferred shares, (2) new convertible preferred shares, (3) new non-convertible preferred shares and (4) old non-convertible preferred shares.

Table 5.4 OLS regression results - QDYP as a dependent variable

Table 5.4 presents OLS regression estimates for Model 2 – QDYP as a dependent variable. The dependent variable is quarterly dividend yield of preferred shares (qdyp). The independent variables are quarterly dividend yield of common shares (qdyc), 5 year trailing revenue compound growth rate (grth), beta of preferred shares measured in 30 day beta of the preferred shares (beta), relative liquidity of the preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), dummy variable for share buyback (dsbb), leverage measured in debt-to-capital (lvrg), time to conversion (ttc), market credit spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld), dummy variable for the interest rate environment (drate), market return measured in Korean index KOSPI's quarterly return (mkt), dummy variable for the 1998 Asian Financial Crisis (dafc), dummy variable for the 2002 Credit Card Crisis in Korea (dccc), dummy variable for the 2008 Subprime Mortgage Crisis (dsmc) and dummy variable for the dividend cumulativeness (dcml). Each column represents regressions for four groups: (1) all preferred shares, (2) new convertible preferred shares, (3) new non-convertible preferred shares and (4) old preferred shares. It must be noted time to conversion (ttc) is only applicable to regression (2) given its convertibility. Given multicollinearity of dividend cumulativeness (dcml), we dropped dcml.

	(1)	(2)	(3)	(4)
	All	New Convertible	New Non-Convertible	Old Non-Convertible
VARIABLES	qdrp	qdrp	qdrp	qdrp
qdrc	1.0976***	1.0778***	1.4263***	1.0812***
	(59.882)	(10.282)	(20.650)	(55.255)
grth	-0.0053**	-0.0077	0.0008	-0.0068**
	(-2.003)	(-0.579)	(0.082)	(-2.306)
beta	-0.0005	-0.0004	-0.0046**	-0.0001
	(-0.712)	(-0.166)	(-2.253)	(-0.148)
liq	-0.0001**	-0.0002***	0.0004*	-0.0000
	(-2.403)	(-2.827)	(1.664)	(-1.623)
size	-0.0077***	-0.0179**	-0.0135***	-0.0055***
	(-4.656)	(-2.023)	(-2.995)	(-2.982)
block	0.0026	-0.0194	-0.0299**	0.0067*
	(0.762)	(-1.031)	(-2.294)	(1.892)
dsbb	0.0016**	-0.0010	-0.0037*	0.0026***
	(1.982)	(-0.282)	(-1.898)	(2.908)
ttc		0.0003		
		(0.485)		
lvrg	0.0024	0.0037	-0.0220*	0.0016
	(1.035)	(0.351)	(-1.663)	(0.677)
drate	-0.0010	0.0039	-0.0029	-0.0014
	(-1.175)	(1.133)	(-1.078)	(-1.434)
yld	0.3734***	-0.1940	0.5972***	0.4154***
	(5.748)	(-0.873)	(3.226)	(5.738)
mkt	0.0063	-0.0175	-0.0032	0.0109**
	(1.583)	(-1.219)	(-0.272)	(2.473)
dafc	0.0112***	-0.0188***	0.0118**	0.0149***
	(5.565)	(-2.658)	(2.120)	(6.594)
dccc	-0.0015	-0.0070	-0.0103*	-0.0002
	(-0.809)	(-1.108)	(-1.908)	(-0.095)
dsmc	-0.0031**	-0.0097*	-0.0100**	-0.0012
	(-2.007)	(-1.847)	(-2.164)	(-0.671)
Constant	0.0804***	0.1763**	0.1616***	0.0588***
	(5.232)	(2.178)	(3.821)	(3.426)
Observations	4,182	370	443	3,351
Firm fixed effects	Yes	Yes	Yes	Yes
F-stat	341.55	12.68	45.01	300.95
Adjusted R-squared	0.679	0.542	0.675	0.694

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In regression (2) for convertible preferred shares, we have four independent variables with 95% significant coefficients; quarterly dividend yield of common shares (QDYC), dummy variable for the 1998 Asian Financial Crisis (dafc), relative liquidity of preferred shares over common shares (liq) and firm size (size). On average, QDYP is positively associated with QDYC and has significant coefficient of 1.0778 (t-value 10.282). The cost of common shares exerts significant influence on the cost of preferred shares. Relative liquidity of preferred shares is negatively associated with the QDYP with significant coefficient of -0.0002 (t-value -2.827). As seen both in Model 1 and Model 2, we see strong evidence for the liquidity premium.

Interestingly, Model 2 has a significant negative coefficient of -0.0179 (t-value -2.023) for the size variable. Given the larger size, firms are more closely monitored by outsiders and may be exposed to less agency costs. Lastly, the dummy variable for the 1998 Asian Financial Crisis has a significant negative coefficient of -0.0188 (t-value -2.658) suggesting the cost of preferred share declined during the 1998 Asian Financial Crisis. Yet, we are cautious with this result as we have significant coefficients for other non-convertible preferred shares with the opposite positive signal.

CHAPTER VI. ROBUSTNESS CHECKS

As seen in Tables 6.1 and 6.2, we conducted two robustness checks on different groups of preferred shares. In our robustness checks, we considered two important variables for preferred shares. First, we considered dividend cumulativeness as this provides significant protective features to dividend cash flow. Regarding the dividend cumulativeness, we run regression 1 (cumulative) and regression 2 (non-cumulative). We focus on different regression results between the cumulative group and the non-cumulative groups. Second, we also considered the 2008 Subprime Mortgage Crisis. The 2008 Crisis dramatically changed interest rates to zero or even minus rates. It lasted a long period of more than 10 years. We created two groups around the 2008 Subprime Mortgage Crisis. We run regression 3 (before the 2008 Crisis) and regression 4 (after the 2008 Crisis).

Table 6.1 Summary statistics - Robustness checks

Table 6.1 presents sample statistics for the principle variables for Robustness checks. We grouped preferred shares into four groups. Panel A shows all preferred shares with cumulative dividends. Panel B shows all preferred shares with non-cumulative dividends. Panel C shows all preferred shares traded before the 2008 Crisis. Panel D shows all preferred shares traded after the 2008 Crisis. The dependent variable is the preferred share premium over common shares (prem). It has following dependent variables; dividend yield gap between preferred shares and common shares (dyg), beta of preferred shares measured in 30 day beta of the preferred shares (beta), relative liquidity of preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), leverage measured in debt-to-capital (lvrg), market yield spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld) and market return measured in Korean index KOSPI's quarterly return (mkt).

	Mean	SD	5th pctl.	25th pctl.	Median	75th pctl.	95th pctl.	Obs.
A. All preferred shares with cumulative dividends								
prem	-0.1882	0.3812	-0.6117	-0.4309	-0.2758	-0.0820	0.6508	582
dyg	0.0092	0.0256	-0.0158	0.0000	0.0042	0.0204	0.0374	582
qdrp	0.0296	0.0345	0.0000	0.0000	0.0222	0.0479	0.0859	568
qdrc	0.0199	0.0225	0.0000	0.0000	0.0159	0.0281	0.0598	568
grth	0.0411	0.1336	-0.2751	-0.0251	0.0570	0.1109	0.2411	476
beta	0.3941	0.4349	-0.1756	0.1312	0.3510	0.6138	1.1946	575
liq	2.1124	4.8754	0.0560	0.2778	0.6254	1.5907	8.6661	582
size	9.0207	0.5536	8.0597	8.6955	8.9859	9.2396	10.1231	564
block	0.4481	0.1432	0.1845	0.3477	0.4468	0.5369	0.6788	567
lvrg	0.4741	0.2588	0.0323	0.3527	0.5018	0.6080	0.8030	563
yld	0.0082	0.0058	0.0032	0.0042	0.0074	0.0101	0.0147	582
mkt	0.0293	0.1109	-0.1533	-0.0257	0.0233	0.0700	0.2280	582

B. All preferred shares with non-cumulative dividends								
prem	-0.1790	1.1420	-0.7041	-0.5656	-0.4320	-0.2261	0.7761	4,302
dyg	0.0137	0.0224	-0.0061	0.0003	0.0102	0.0225	0.0492	4,302
qdrp	0.0316	0.0333	0.0000	0.0061	0.0240	0.0466	0.0920	4,178
qdrc	0.0176	0.0208	0.0000	0.0035	0.0121	0.0236	0.0557	4,178
grth	0.0853	0.1330	-0.0904	0.0164	0.0798	0.1385	0.2852	3,810
beta	0.5242	0.4565	-0.1371	0.2269	0.4898	0.7972	1.2820	4,279
liq	3.8056	16.1134	0.1066	0.3880	0.8331	2.1722	13.9677	4,302
size	9.3594	0.8361	8.0389	8.7215	9.3744	9.9090	10.8473	4,197
block	0.3903	0.1669	0.1605	0.2597	0.3640	0.4871	0.7257	4,200
lvrg	0.4181	0.2352	0.0133	0.2572	0.4548	0.5765	0.7310	4,172
yld	0.0079	0.0056	0.0029	0.0042	0.0067	0.0099	0.0147	4,302
mkt	0.0303	0.1108	-0.1533	-0.0310	0.0233	0.0700	0.2280	4,302
C. All preferred shares traded before 2008 subprime mortgage crisis								
prem	-0.1729	1.0472	-0.6426	-0.5205	-0.3984	-0.1952	0.7159	2,274
dyg	0.0148	0.0286	-0.0176	0.0000	0.0119	0.0258	0.0631	2,274
qdrp	0.0384	0.0412	0.0000	0.0022	0.0293	0.0566	0.1196	2,274
qdrc	0.0234	0.0260	0.0000	0.0037	0.0166	0.0324	0.0750	2,274
grth	0.1053	0.1530	-0.0795	0.0276	0.0894	0.1590	0.3486	1,902
beta	0.5213	0.4167	-0.1007	0.2324	0.4896	0.7781	1.2515	2,251
liq	2.9246	15.9274	0.1392	0.4295	0.9402	2.0200	8.3137	2,274
size	9.1907	0.8079	7.8709	8.5982	9.0785	9.7494	10.6666	2,263
block	0.3651	0.1597	0.1568	0.2506	0.3426	0.4547	0.6893	2,157
lvrg	0.4475	0.2557	0.0110	0.2811	0.4746	0.6128	0.7667	2,263
yld	0.0079	0.0036	0.0032	0.0042	0.0077	0.0111	0.0147	2,274
mkt	0.0567	0.1350	-0.1590	-0.0257	0.0581	0.1363	0.3270	2,274
D. All preferred shares traded after 2008 subprime mortgage crisis								
prem	-0.1863	1.1076	-0.7219	-0.5883	-0.4255	-0.2067	0.8077	2,610
dyg	0.0117	0.0162	-0.0025	0.0011	0.0085	0.0193	0.0383	2,610
qdrp	0.0249	0.0224	0.0000	0.0063	0.0203	0.0388	0.0658	2,472
qdrc	0.0128	0.0131	0.0000	0.0029	0.0096	0.0182	0.0386	2,472
grth	0.0605	0.1123	-0.1153	0.0000	0.0629	0.1229	0.2242	2,384
beta	0.4979	0.4870	-0.1702	0.2000	0.4556	0.7727	1.2884	2,603
liq	4.1957	14.5642	0.0829	0.3242	0.7073	2.2304	18.0581	2,610
size	9.4358	0.8043	8.3690	8.7898	9.3497	9.9874	11.0540	2,498
block	0.4236	0.1653	0.1710	0.3050	0.4101	0.5056	0.7334	2,610
lvrg	0.4039	0.2201	0.0178	0.2606	0.4441	0.5407	0.7060	2,472
yld	0.0081	0.0069	0.0025	0.0042	0.0053	0.0094	0.0318	2,610
mkt	0.0071	0.0770	-0.1533	-0.0310	0.0215	0.0475	0.1402	2,610

Table 6.2 OLS regression results - Robustness checks

Table 6.2 presents OLS regression estimates for robustness checks. The dependent variable is the preferred share premium over common shares. The independent variables are dividend yield gap between preferred shares and common shares (dyg), 5 year trailing revenue compound growth rate (grth), beta of preferred shares measured in 30 day beta of the preferred shares (beta), relative liquidity of the preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), dummy variable for the share buyback (dsbb), leverage measured in debt-to-capital (lvrg), dummy variable for the rate environment (drate), market yield spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld) and market return measured in Korean index KOSPI's quarterly return (mkt). Dummy variable for the 1998 Asian Financial Crisis (dafc), dummy variable for the 2002 Credit Card Crisis in Korea (dccc) and dummy variable for the

2008 Subprime Mortgage Crisis (dsmc) are not applicable to the Robustness Checks given their focus on the 2008 Subprime Mortgage Crisis. Each column represents regressions for four groups: (1) all preferred shares with cumulative dividends, (2) all preferred shares with non-cumulative dividends, (3) all preferred shares with trading before the 2008 Crisis and (4) all preferred shares with trading after the 2008 Subprime Mortgage Crisis.

	(1)	(2)	(3)	(4)
	Cumulative	Non-Cumulative	Before 2008	After 2008
VARIABLES	prem	prem	prem	prem
dyg	-0.7391*	-5.5076***	-2.9233***	-5.6287***
	(-1.925)	(-7.937)	(-4.078)	(-5.767)
grth	0.0736	-0.0048	0.0057	-0.3259**
	(0.804)	(-0.045)	(0.035)	(-2.072)
beta	-0.0055	-0.0061	-0.0390	0.0607**
	(-0.252)	(-0.199)	(-0.825)	(2.189)
liq	0.0037	0.0048***	0.0030**	0.0070***
	(1.296)	(5.521)	(2.352)	(7.768)
size	-0.3866***	-0.0947	0.1356	-0.2629**
	(-7.847)	(-1.361)	(1.123)	(-2.434)
block	0.5853***	-1.0499***	-0.0991	-0.7464***
	(4.948)	(-7.508)	(-0.538)	(-3.475)
dsbb	0.0095	0.0319	0.1313***	0.0043
	(0.357)	(0.982)	(2.947)	(0.127)
lvrg	-0.0601	0.0872	0.1767	0.3125**
	(-0.970)	(0.901)	(1.480)	(2.196)
drate	-0.1125***	-0.0128	-0.0009	-0.1136**
	(-4.319)	(-0.345)	(-0.020)	(-2.261)
yld	-1.2874	-1.5672	25.1761***	-4.5792*
	(-0.683)	(-0.573)	(3.750)	(-1.766)
mkt	-0.4604***	-0.5880***	-0.5509***	-0.5433**
	(-3.719)	(-3.555)	(-3.122)	(-2.540)
Constant	3.1361***	1.1810*	-1.6109	2.5825***
	(7.157)	(1.825)	(-1.434)	(2.604)
Observations	464	3,718	1,811	2,371
Firm fixed effects	Yes	Yes	Yes	Yes
F-stat	12.93	14.88	6.56	18.15
Adjusted R-squared	0.736	0.620	0.648	0.753

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

From the four regressions, we have confirmed the negative relation between the dividend yield gaps and the preferred share premium with 95% confidence intervals. This supports our result for Model 1. Regarding liquidity, except regression 1 (cumulative), all regressions supported the positive liquidity premium. This confirms the liquidity premium shown in Model 1. It is interesting for all of the four groups in our robustness checks the market return (mkt) has shown 99% significant coefficients indicating negative relations between the market returns and

the preferred share premium. This supports hypothesis 6 that the premium of convertible preferred shares over common shares is negatively related to market movements and sentiments.

As discussed in our descriptive statistics, we hypothesized that the dividend cumulativeness exerts significant influences on the valuation of preferred shares. We found interesting differences between the cumulative group and the non-cumulative group. First, the liquidity variable is significant for the non-cumulative group with 99% confidence interval but is insignificant for the cumulative group. The assured cash flow provides greater protection to the holders of the cumulative preferred shares than the holders of the non-cumulative preferred shares. This makes the non-cumulative preferred shares more sensitive to the liquidity. Second, the cumulative group has shown a significant negative coefficient in the size variable, while the non-cumulative group has insignificant relations with the size variable. Lastly, it is quite interesting that the coefficients for the block holding have opposite signals, with a positive coefficient for the cumulative group and a negative coefficient for the non-cumulative group. This suggests the cash flow guarantee of the cumulative preferred shares leads into the greater value of the block holding shares. The different results suggest that the cumulative dividends are an important factor in determining the values of preferred shares.

Additionally, given the binding cash flow, the cumulative dividends may make the preferred shares more bond-like with significant relations to the credit market related variables. It is interesting that the dummy variable for the interest rate environment has a significant negative coefficient (coefficient -0.1125 and t-value -4.319) for the cumulative preferred shares. Like a bond, the higher market interest rates result in the lower prices of the cumulative preferred shares.

Furthermore, to clearly observe the valuation difference between the three types of the preferred shares, in Table 6.3 we introduced dummy variables for the three types of the preferred

shares and their interactions with the six interest rate related variables. The three dummy variables are dummy variable for new convertible preferred shares (dncv), dummy variable for new non-convertible preferred shares (dnnc) and dummy variable for old preferred shares (dold). In Table 6.3, we find interesting patterns in the regression results. First, as seen in column (2), (3) and (4), each of the three dummy variables shows significant coefficients for dncv, dnnc and dold within 99% confidence intervals. Also, we need to note that dummy variables for new convertible preferred shares and new non-convertible preferred shares have positive coefficients, while dummy variable for old preferred shares have negative coefficient. This suggests that the types of the preferred shares are major determinants of the preferred shares valuation. The signals of the coefficients support our mathematical reasoning explained with equations (5.1), (5.2) and (5.3) that there are significant values for convertibility and cumulative dividends.

Table 6.3 Introducing dummy variables and interactions

Table 6.3 introduces dummy variables for new convertible preferred shares (dncv), new non-convertible preferred shares (dnnc), old non-convertible preferred shares (dold) and their interactions with interest related variables including dividend yield gap between preferred shares and common shares (dyg), relative liquidity of the preferred shares compared to common shares (liq), block holding shares (block), market return measured in Korean index KOSPI's quarterly return (mkt), dummy variable for the 1998 Asian Financial Crisis (dafc) and dummy variable for the 2008 Subprime Mortgage Crisis (dsmc). Table 6.3 presents OLS regression on the above variables setting premium as a dependent variable. In addition to the new variables, the independent variables for this regression are dividend yield gap between preferred shares and common shares (dyg), 5 year trailing revenue compound growth rate (grth), beta of preferred shares measured in 30 day beta of the preferred shares (beta), relative liquidity of the preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), dummy variable for the share buyback (dsbb), time to conversion (ttc), leverage measured in debt-to-capital (lvrg), dummy variable for the rate environment (drate), market yield spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld), market return measured in Korean index KOSPI's quarterly return (mkt), dummy variable for the 1998 Asian Financial Crisis (dafc), dummy variable for the 2002 Credit Card Crisis in Korea (dccc) and dummy variable for the 2008 Subprime Mortgage Crisis (dsmc). Each column represents regressions for six groups: (1) all preferred shares without the new dummy variables, (2) all preferred shares with dncv, (3) all preferred shares with dnnc, (4) all preferred shares with dold, (5) all preferred shares with dncv interactions and (6) all preferred shares with dnnc interactions.

VARIABLES	All prem	dncv prem	dnnc prem	dold prem	dncv interactions prem	dnnc interations prem
dyg	-8.0744***	-4.8194***	-8.1343***	-7.0013***	-6.8722***	-6.4946***
	(-10.118)	(-6.362)	(-10.204)	(-9.024)	(-9.394)	(-7.874)
grth	-0.3542***	-0.3951***	-0.3653***	-0.4758***	-0.4732***	-0.4004***
	(-2.752)	(-3.284)	(-2.841)	(-3.809)	(-4.200)	(-3.154)
beta	-0.1426***	-0.1196***	-0.1339***	-0.1190***	-0.1226***	-0.1405***
	(-3.628)	(-3.254)	(-3.403)	(-3.122)	(-3.565)	(-3.613)
liq	0.0074***	0.0071***	0.0076***	0.0078***	0.0042***	0.0072***
	(6.191)	(6.343)	(6.285)	(6.713)	(3.796)	(6.068)
size	-0.0543***	-0.0534***	-0.0575***	0.0031	-0.0383***	-0.0514***
	(-7.517)	(-7.909)	(-7.907)	(0.392)	(-6.041)	(-7.195)
block	0.8557***	0.5788***	0.8746***	0.9263***	0.2178**	0.8220***
	(8.582)	(6.166)	(8.770)	(9.579)	(2.441)	(8.305)
dsbb	0.1005**	0.1235***	0.0836*	0.0479	0.0937**	0.1138***
	(2.352)	(3.092)	(1.946)	(1.153)	(2.506)	(2.685)
lvrg	0.2314***	0.2802***	0.2272***	0.2267***	0.3274***	0.2079***
	(3.118)	(4.039)	(3.066)	(3.153)	(5.035)	(2.844)
drate	0.0574	0.0087	0.0586	0.0496	0.0143	0.0550
	(1.188)	(0.192)	(1.215)	(1.060)	(0.339)	(1.157)
yld	4.7752	1.6803	5.0731	5.3900	2.6466	4.5255
	(1.270)	(0.478)	(1.351)	(1.480)	(0.803)	(1.224)
mkt	-0.2836	-0.3584*	-0.2672	-0.2101	-0.2779	-0.4268*
	(-1.240)	(-1.677)	(-1.170)	(-0.948)	(-1.347)	(-1.836)
dafc	0.3116***	0.2512**	0.3134***	0.3083***	0.3598***	-0.0421
	(2.724)	(2.348)	(2.743)	(2.782)	(3.432)	(-0.358)
dccc	0.0521	0.0053	0.0547	0.0531	0.0358	0.0588
	(0.480)	(0.052)	(0.504)	(0.505)	(0.376)	(0.550)
dsmc	-0.1553*	-0.1181	-0.1563*	-0.1422	-0.1114	-0.1744*
	(-1.731)	(-1.408)	(-1.744)	(-1.635)	(-1.364)	(-1.910)
dcml	-0.1500***	-0.7432***	-0.1500***	-0.4062***	-0.7106***	-0.1193**
	(-2.762)	(-13.221)	(-2.766)	(-7.405)	(-13.769)	(-2.225)
dncv_dyg					42.3485***	
					(12.904)	
dncv_liq					0.0375***	
					(10.060)	
dncv_block					3.0321***	
					(22.392)	
dncv_mkt					-0.5652	
					(-1.006)	
dncv_dafc					0.2043	
					(0.687)	
dncv_dsmc					-0.1393	
					(-0.636)	
dncv		1.5149***				
		(24.573)				
dnnc			0.1930***			
			(3.505)			
dold				-0.6896***		
				(-16.537)		
dnnc_dyg						-16.9501***

						(-6.966)
dnnc_liq						0.0317***
						(2.634)
dnnc_block						0.0012
						(0.007)
dnnc_mkt						1.0858*
						(1.756)
dnnc_dafc						3.3436***
						(10.327)
dnnc_dsmc						0.0715
						(0.285)
Observations	4,182	4,182	4,182	4,182	4,182	4,182
F-Stat	31.73	71.78	30.59	48.78	91.04	30.39
Adjusted R-squared	0.099	0.213	0.102	0.155	0.311	0.129

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Second, we also find the regression results for the interactions with the three type dummy variables worth to further emphasize. In both regression (5) and regression (6), the interactions with relative liquidity (dncv_liq and dnnc_liq) have shown positive significant coefficients within 99% confidence intervals. Coefficients for dncv_liq and dnnc_liq are 0.0375 (t-value 10.060) and 0.0317 (t-value 2.634). This suggests that the valuation of the new preferred shares is positively associated with relative liquidity. This supports the liquidity premium observed in Table 5.2 Model 1 regression.

Table 5.2 OLS regression results - Premium as a dependent variable

Table 5.2 presents OLS regression estimates for Model 1 – premium as a dependent variable. The dependent variable is the preferred share premium. The independent variables are dividend yield gap between preferred shares and common shares (dyg), 5 year trailing revenue compound growth rate (grth), beta of preferred shares measured in 30 day beta of the preferred shares (beta), relative liquidity of the preferred shares compared to common shares (liq), firm size measured in log of total assets (size), block holding shares (block), dummy variable for the share buyback (dsbb), time to conversion (ttc), leverage measured in debt-to-capital (lvrg), dummy variable for the rate environment (drate), market yield spread measures in the spread between 3 year AA- corporate bond yields and 3 year treasury bond yields (yld), market return measured in Korean index KOSPI's quarterly return (mkt), dummy variable for the 1998 Asian Financial Crisis (dafc), dummy variable for the 2002 Credit Card Crisis in Korea (dccc) and dummy variable for the 2008 Subprime Mortgage Crisis (dsmc). Each column represents regressions for four groups: (1) all preferred shares, (2) new convertible preferred shares, (3) new non-convertible preferred shares and (4) old preferred shares. It must be noted time to conversion (ttc) is only applicable to regression (2) given its convertibility. Given multicollinearity of dividend cumulativeness (dcml), we dropped dcml.

VARIABLES	(1) All prem	(2) New Convertible prem	(3) New Non-Convertible prem	(4) Old Non-Convertible prem
dyg	-4.8124***	-11.0384***	-25.4451***	-2.9477***
	(-8.172)	(-3.303)	(-7.043)	(-6.990)
grth	0.0212	-0.0582	-0.6633	-0.1238*
	(0.220)	(-0.110)	(-0.957)	(-1.757)
beta	0.0032	0.0120	-0.0952	0.0071
	(0.117)	(0.115)	(-0.637)	(0.351)
liq	0.0047***	0.0324***	0.0216	0.0018***
	(5.666)	(9.635)	(1.400)	(3.070)
size	-0.1253**	-0.4033	0.4682	-0.1996***
	(-2.047)	(-1.139)	(1.403)	(-4.420)
block	-0.9123***	0.6081	-9.8743***	-0.2993***
	(-7.255)	(0.818)	(-10.413)	(-3.413)
dsbb	0.03	0.0053	0.2780*	-0.0409*
	-1.021	(0.038)	(1.955)	(-1.855)
ttc		0.0945***		
		(4.123)		
lvrg	0.0737	1.9312***	2.7443***	-0.1613***
	(0.873)	(4.587)	(2.883)	(-2.741)
drate	-0.0183	-0.2347*	0.4064**	-0.0359
	(-0.556)	(-1.700)	(2.096)	(-1.497)
yld	-1.9007	0.6773	9.1105	-3.7710**
	(-0.781)	(0.075)	(0.670)	(-2.094)
mkt	-0.5838***	-0.2435	-2.6580***	-0.3872***
	(-3.933)	(-0.419)	(-3.154)	(-3.560)
dafc	0.1984***	0.1686	1.7051***	-0.0068
	(2.639)	(0.570)	(4.151)	(-0.122)
dccc	0.0229	0.1471	0.3160	0.0230
	(0.324)	(0.580)	(0.808)	(0.438)
dsmc	-0.1791***	-0.1106	-1.1640***	-0.0726*
	(-3.081)	(-0.521)	(-3.448)	(-1.695)
Constant	1.4062**	3.9824	-1.9543	1.8277***
	(2.488)	(1.238)	(-0.621)	(4.391)
Observations	4,182	370	443	3,351
Firm fixed effects	Yes	Yes	Yes	Yes
F-stat	15.53	13.49	18.29	12.55
Adjusted R-squared	0.619	0.889	0.532	0.346

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In regression (5), the other two interactions of dncv_dyg and dncv_block have shown significant positive coefficients. This confirms there are positive relations between the valuation new convertible preferred shares and dividend yield gaps and block holding shares. In contrast to regression (5), regression (6) has opposite results in terms of dncv_dyg and dncv_blocks

interactions. This implies the convertibility exerts contrasting influences on dividend yield gaps and block holding shares.

CHAPTER VII. CONCLUSION

We have found that the convertible preferred share premium over the common shares in Korea is -4% on median in contrast to -43% and -44% for the new non-convertible preferred shares and the old non-convertible preferred shares, respectively. By comparing different values among common shares, convertible preferred shares and non-convertible preferred shares, we calculated that 43% and 39% of common shares are values for voting rights and dividend cumulativeness, respectively. This suggests that there are significant values for the corporate governance related values and the dividend cumulativeness. The time series analysis on the relation between the convertible preferred share premium and time to conversion indicates that the corporate governance related values are discounted by time and getting more valuable as approaching to the conversion. We also found profitable arbitrage trading opportunities between the convertible preferred shares and the common shares. This thesis provides new evidences for the values of convertibility, voting rights and dividend guarantees.

We have run two models of OLS regressions to test six hypotheses on the fundamental factors explaining the convertible preferred share premium. Our empirical results suggest that the convertible preferred share premium is negatively associated with the dividend yield gap. This is probably due to the voting right recovery function of the preferred shares during the dividend omission. On average, the convertible preferred share premium is positively associated with leverage and time to conversion. In sum, the dividend yield guarantees, leverage, and convertibility exert significant influence on the convertible preferred shares premium.

This thesis focuses on the convertible preferred share premium in Korean market. We believe promising future research areas will be 1) expansion of this research into other markets, 2) deeper inquisition into preferred shares of financial firms and restructuring firms, which

effectively use the preferred shares as an important capital policy tool, 3) exploring more theoretical discussions on the equity-bond dichotomy between the convertible preferred shares and the other two non-convertible preferred shares and 4) development of a mathematical valuation model and its proofs for the convertible preferred shares.

APPENDIX A. DESCRIPTION OF VARIABLES

Variables	Notation	Original	Adjusted	Data Source	Description
Preferred share premium	prem	Daily	Quarterly	Datastream	(Preferred share price - Common share price)/Common share price, Calculated daily and then averaged them into a quarterly base
Quarter dividend yield of preferred share	qdyp	Annual	Quarterly	Datastream	PS dividend at year end/ average PS price over a quarter
Quarter dividend yield of common share	qdyc	Annual	Quarterly	Datastream	CS dividend at year end/ average CS price over a quarter
Dividend yield gap	dyg	Annual	Quarterly	Datastream	Dividend yield of Preferred share - Dividend yield of Common share, Used year end annual dividend for interim quarters of the year
Control: Long-term growth	grth	Annual	Quarterly	Datastream	Trailing 5-year CAGR revenue growth. Used annual revenue
Control: Beta	beta	Daily	Quarterly	Datastream	30-day common share beta. Used market index KOSPI and common share price for returns
Control: Relative liquidity	liq	Daily	Quarterly	Datastream	Liquidity of the preferred shares relative to the liquidity of common shares LCS (liquidity of CS = Volume of CS / total CS outstanding) LPS (liquidity of PS) = Volume of PS / total PS outstanding) The ratio RL (relative liquidity) = LPS/LCS
Control: Size	size	Annual	Quarterly	Datastream	Measured firm size with log of total assets
Shareholdings of block holders	block	Quarterly	Quarterly	Public filing	Collected shareholdings of block holders of common shares Gathered them from the DART quarterly filing
Control: share buyback	dsbb	Quarterly	Quarterly	Datastream	Calculated quarterly changes in shares outstanding Identified with reduced shares outstanding with reasonable size as shares buyback. A dummy variable for share buyback=1 and otherwise=0
Leverage	lvrg	Annual	Quarterly	Datastream	Datastream calculated annual debt-to-capital ratio (Long Term Debt + Short Term Debt + Current Portion of Long Term Debt) / (Total Capital + Short Term Debt + Current Portion of Long Term Debt) x 100
Time to conversion	ttc	Quarterly	Quarterly	Public filing	Measures time to conversion. For example, for 10 years of time to conversion, -10 + lapsed number of quarters x 0.25
Market yield	yld	Daily	Quarterly	Bank of Korea	The spread between yield on 3-year AA- grade corporate bond and 3-year Treasury bond Calculated daily ratio and then averaged them into a quarterly

					base
Control: Rate	drate	Quarterly	Quarterly	Datastream	A dummy variable for the market rate environment with the high rate environment =1 and otherwise =0. Defined the high rate environment as the rate higher than 5.17%, the 19 year average rate for the 3 year AA- corporate bond yield
Market return	mkt	Daily	Quarterly	Datastream	Using market index KOSPI, averaged quarter level and calculated their returns (Quarter average of index Q1 - Quarter average of index Q2)/ Quarter average of index Q2
Control: Crisis 1	dafc	Quarterly	Quarterly	Datastream	A dummy variable for Asian Financial Crisis with crisis=1 and otherwise=0 Defined a crisis as quarterly market retreat of greater than 5% DAFC covers period from 3Q 1998 to 4Q 2000
Control: Crisis 2	dccc	Quarterly	Quarterly	Datastream	A dummy variable for Korea Credit Card Crisis with crisis=1 and otherwise=0 Defined a crisis as quarterly market retreat of greater than 5% DCCC covers period from 2Q 2002 to 1Q 2003
Control: Crisis 3	dsmc	Quarterly	Quarterly	Datastream	A dummy variable for Subprime Mortgage Crisis with crisis=1 and otherwise=0 Defined a crisis as quarterly market retreat of greater than 5% DSMC covers period from 1Q 2008 to 4Q 2008
Dividend cumulativeness	dcml	Quarterly	Quarterly	Public filing	A dummy variable for dividend cumulativeness with cumulative=1 and otherwise=0

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